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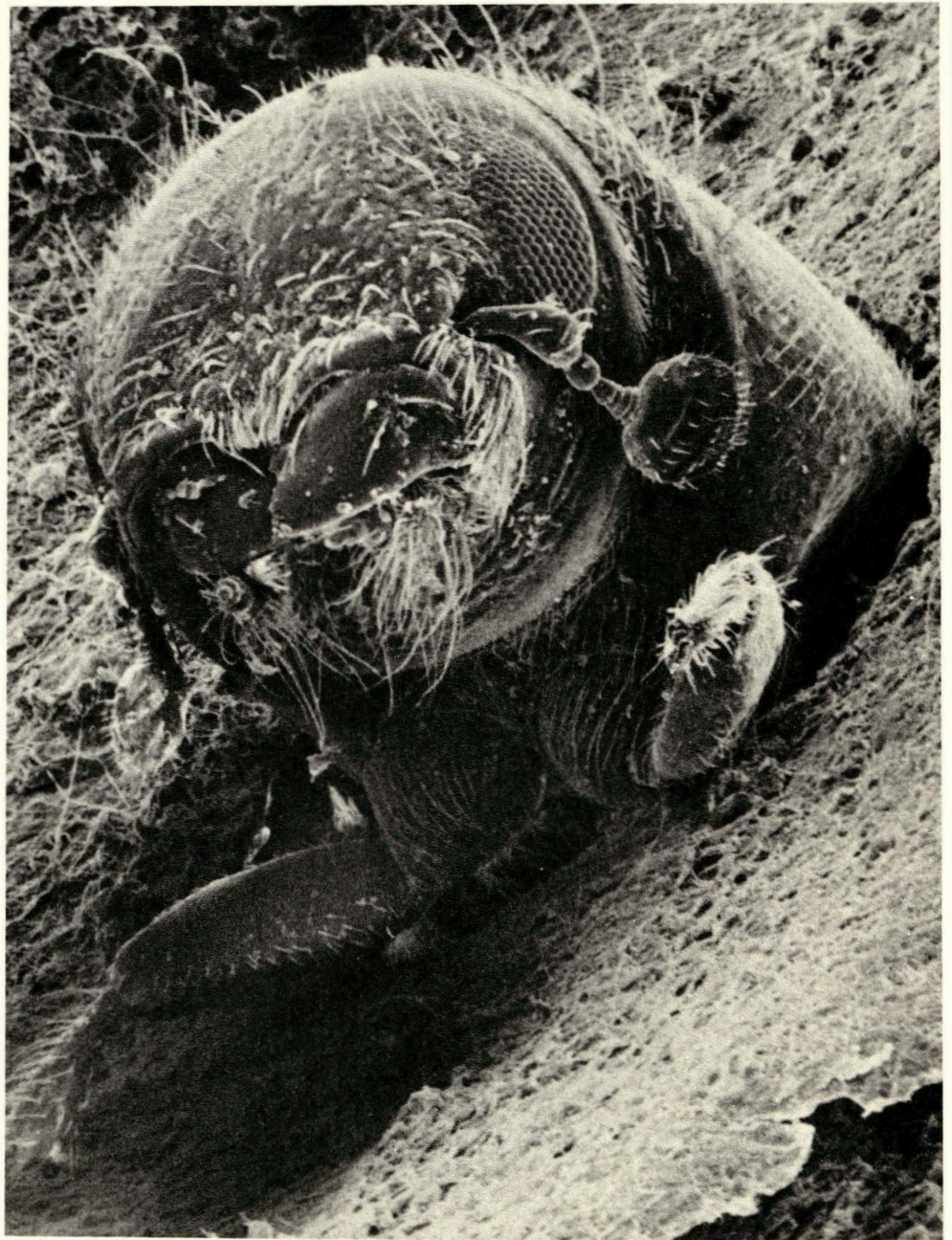
Forest
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Forest
Pest
Management

Washington, DC



Forest Insect and Disease Conditions in the United States 1986



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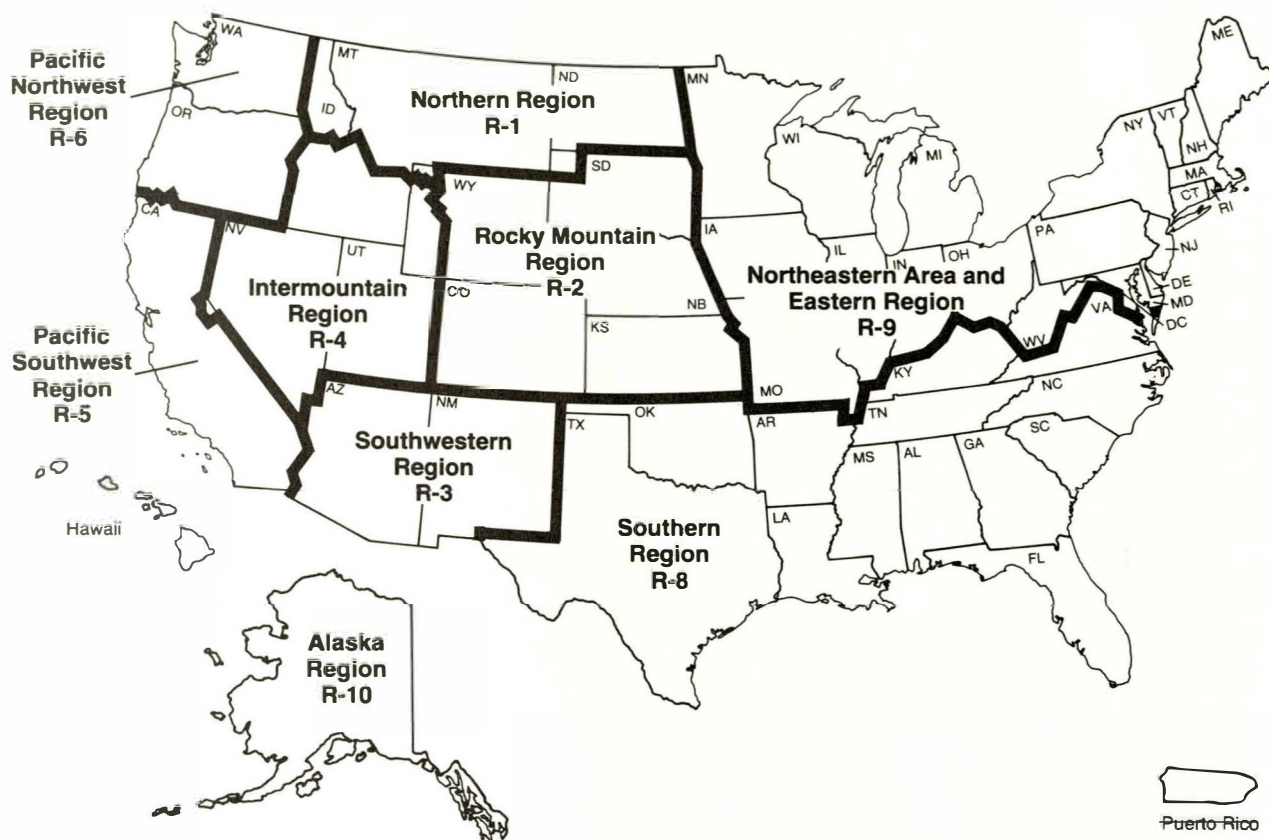
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Additional copies of this report are available from the Forest Service, Forest Pest Management, P.O. Box 96090, Washington, DC 20090-6090.

Cover: Image of southern pine beetle seen through an electron microscope. Courtesy of Thomas Payne, VPI, Blacksburg, VA

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Introduction

This three-part publication provides an overall perspective of forest insect and disease conditions in the United States during 1986.

The report begins with summaries of the current status of major insect and disease pests. These summaries are followed by detailed information about pest conditions on all landownerships in the Forest Service Regions. The Regions are arranged numerically, with the Northern Region, Region 1, first and the Alaska Region, Region 10, last. Each Region has two tables: an insect table followed by a disease table. The report ends with indexes of the common and scientific names of insects and disease-causing organisms.

This is the 36th year that Forest Pest Management, U.S. Department of Agriculture, Forest Service, has published this report. As in past years, Forest Pest Management offices nationwide compiled the information for lands of all ownerships. Much of the information is based on special aerial or ground surveys. These surveys record short-term changes in pest activity, and they supplement the tree mortality information gathered in periodic forest resource inventory surveys done by the Forest Service.

We appreciate the assistance of all State, Federal, and private cooperators who provided information for this report.

For further information about conditions in a particular State, contact the responsible Forest Pest Management staff at the following addresses:

Northern Region (R-1) P.O. Box 7669 Missoula, MT 59807	Pacific Southwest Region (R-5) 630 Sansome Street San Francisco, CA 94111
Rocky Mountain Region (R-2) P.O. Box 25127 Lakewood, CO 80225	Pacific Northwest Region (R-6) P.O. Box 3623 Portland, OR 97208
Southwestern Region (R-3) Federal Building 517 Gold Avenue, S.W. Albuquerque, NM 87102	Southern Region (R-8) 1720 Peachtree Road, N.W. Atlanta, GA 30367
Intermountain Region (R-4) Federal Building 324 25th Street Ogden, UT 84401	Eastern Region (R-9) and Northeastern Area 370 Reed Road Broomall, PA 19008
	Alaska Region (R-10) 201 E. 9th Avenue Anchorage, AK 95501

Part 1. National Summary

Gypsy Moth

In 1986, the gypsy moth (*Lymantria dispar*) defoliated 2.4 million acres in the generally infested area of the Eastern United States--an increase over the 1985 acreage. Defoliation is predicted to increase again in 1987.

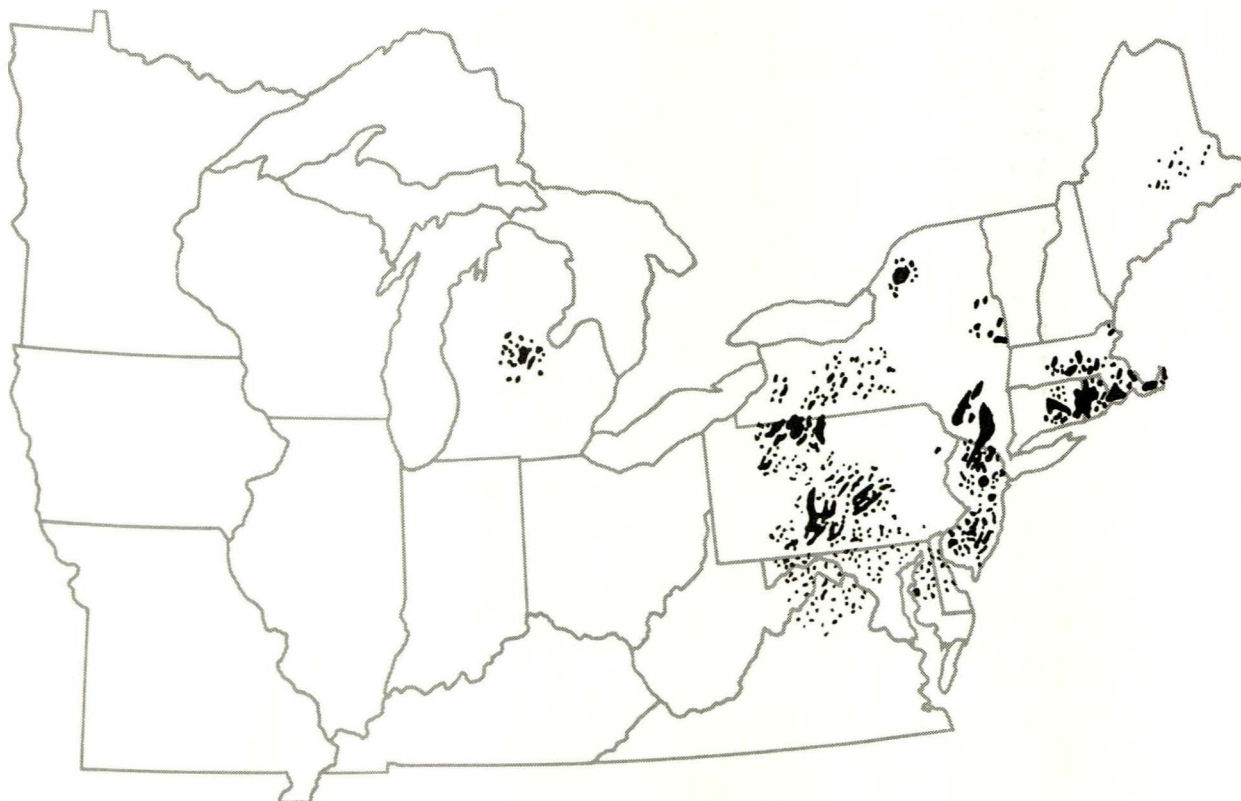
Gypsy moth populations continued their rapid southward spread. The southern edge of the generally infested area extends through the northern half of Augusta County in Virginia east to Richmond and southeast across the Chesapeake Bay to Northampton County.

Beyond the generally infested area, isolated infestations were treated in nine States: Illinois, Indiana, Kentucky, Minnesota, North Carolina, Ohio, Oregon, Washington, and Virginia. In all, these isolated infestations covered 205,000 acres in 38 counties and 3 independent cities.

Acres of aerially detected defoliation caused by the gypsy moth during 1985 and 1986

State	1985	1986
Connecticut	89,500	237,200
Delaware	5,100	3,100
Maine	6,700	11,600
Maryland	83,500	58,200
Massachusetts	414,100	343,100
Michigan	18,500	61,400
New Hampshire	0	0
New Jersey	239,400	280,300
New York	129,800	175,400
Pennsylvania	581,100	987,800
Rhode Island	133,900	219,200
Vermont	0	0
Virginia	5,200	27,300
West Virginia	2,500	8,300
Total	1,709,300	2,412,900

1986 Gypsy Moth Defoliation



Counties Where Isolated Infestations Treated During 1986

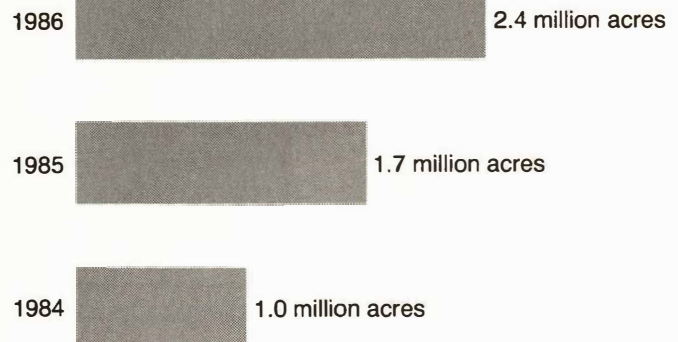


Two, large, isolated gypsy moth infestations currently exist in the United States: one in Oregon and the other in North Carolina.

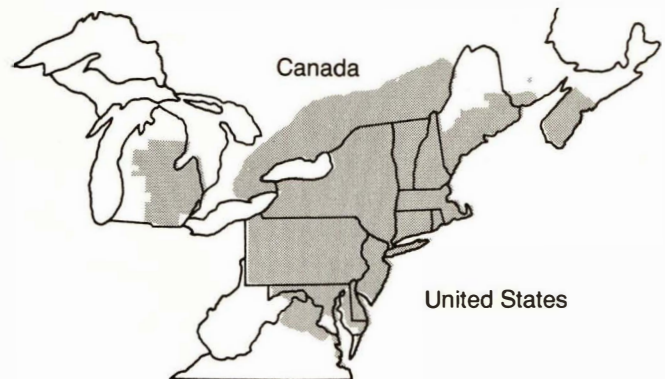
In Lane County, OR, following the second year of multiple applications of Bacillus thuringiensis, only isolated patches of the original 227,000-acre infestation remain. In 1986, only 17 moths were trapped within the treated areas out of a total of 109 moths captured within the quarantine area. Over 19,000 moths were trapped in 1984.

In Clay County, NC, a large isolated infestation was recently discovered on the Nantahala National Forest in the southwestern corner of the State. The infestation covered about 11,000 acres. An eradication program is planned for 1987.

Acres Defoliated by Gypsy Moth



1986 Gypsy Moth Generally Infested Area



Southern Pine Beetle

The southern pine beetle (*Dendroctonus frontalis*) outbreak expanded during 1986.

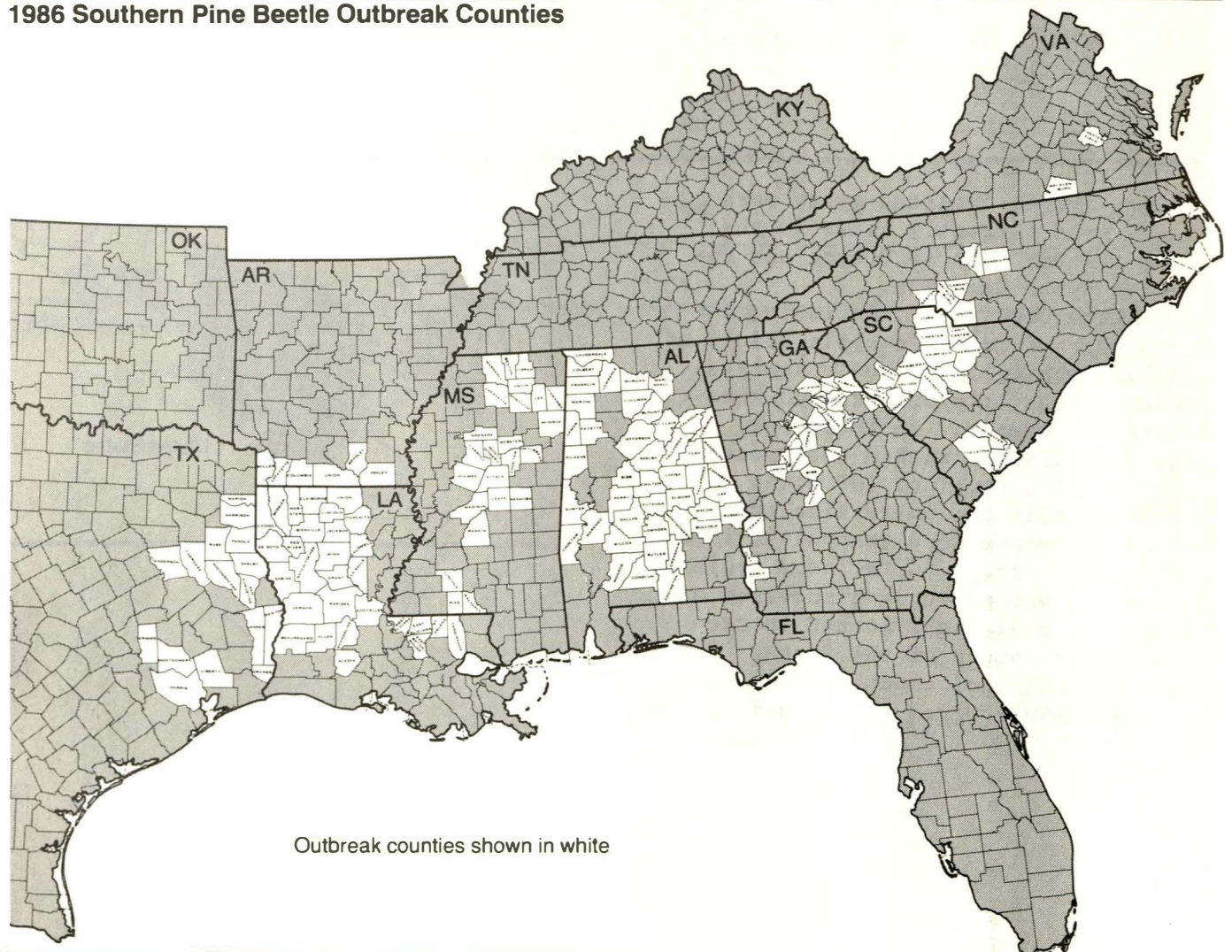
The South reported more than 80,000 spot infestations compared to 50,000 in 1985. The numbers of spots by State are listed on page 61.

The number of "outbreak counties," or counties with one or more multiple-tree spots per 1,000 acres of host type,

also increased. In 1986, 165 counties in 9 States were classed as outbreak counties compared to 72 counties in 7 States in 1985.

In addition, the amount of outbreak acreage expanded to 26.4 million acres--an increase of 11 million acres during 1986. Alabama with 44 outbreak counties and Louisiana with 29 outbreak counties had the most acreage in outbreak status.

1986 Southern Pine Beetle Outbreak Counties



Southern Pine Beetle

Southern pine beetle outbreak counties

Alabama: Autauga, Bibb, Blount, Bullock, Butler, Calhoun, Chambers, Chilton, Choctaw, Clay, Cleburne, Colbert, Conecuh, Coosa, Covington, Crenshaw, Cullman, Dallas, Elmore, Fayette, Franklin, Jefferson, Lamar, Lauderdale, Lawrence, Lee, Lowndes, Macon, Marengo, Marion, Marshall, Monroe, Montgomery, Morgan, Perry, Pickens, Randolph, Russell, Shelby, St. Clair, Sumter, Talladega, Tallapoosa, Wilcox

Arkansas: Ashley, Bradley, Columbia, Lafayette, Miller, Union

Georgia: Baldwin, Bibb, Butts, Clarke, Clay, Early, Elbert, Greene, Houston, Jackson, Jasper, Lamar, Lincoln, Madison, Monroe, Morgan, Newton, Oconee, Oglethorpe, Rockdale, Stewart, Taliaferro, Upson

Louisiana: Acadia, Allen, Avoyelles, Beauregard, Bienville, Bossier, Caddo, Caldwell, Claiborne, De Soto, East Baton Rouge, East Feliciana, Evangeline, Grant, Jackson, La Salle, Lincoln, Natchitoches, Ouachita, Rapides, Red River, Sabine, St. Helena, Tangipahoa, Union, Vernon, Webster, West Feliciana, Winn

Mississippi: Attala, Benton, Carroll, Choctaw, Grenada, Holmes, Itawamba, Lafayette, Leake, Lee, Lincoln, Madison, Marshall, Monroe, Montgomery, Neshoba, Oktibbeha, Pike, Pontotoc, Rankin, Tippah, Union, Walthall, Webster

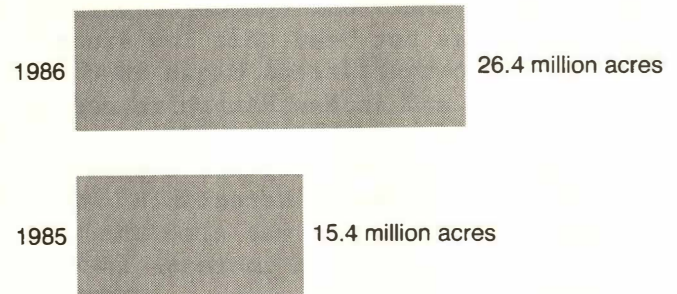
North Carolina: Cabarrus, Davidson, Gaston, Mecklenburg, Randolph, Union

South Carolina: Charleston, Chester, Colleton, Dorchester, Edgefield, Fairfield, Greenwood, Kershaw, Lancaster, Lexington, McCormick, Newberry, Richland, Saluda, York

Texas: Anderson, Cherokee, Grimes, Harris, Harrison, Jasper, Liberty, Marion, Montgomery, Nacogdoches, Newton, Orange, Panola, Rusk, San Augustine, Shelby

Virginia: Chesterfield, Mecklenburg

Southern Pine Beetle Outbreak Acres



Acres of southern pine beetle outbreaks during 1985 and 1986 *

State	1985	1986
Alabama	3,926,000	7,529,300
Arkansas	648,500	1,372,900
Georgia	1,007,000	1,839,100
Florida	0	0
Kentucky	0	0
Louisiana	3,094,800	6,431,800
Mississippi	270,200	2,383,200
North Carolina	0	343,500
Oklahoma	0	0
South Carolina	2,066,100	2,904,200
Tennessee	0	0
Texas	4,433,800	3,409,800
Virginia	0	175,100
Total	15,446,400	26,388,900

* Acres of outbreak are acres of host type in outbreak counties, that is, counties having one or more multiple-tree spots per 1,000 acres.

NOTE: A county is in outbreak status when it has one or more multiple-tree spots per 1,000 acres of host type.

Spruce Budworm

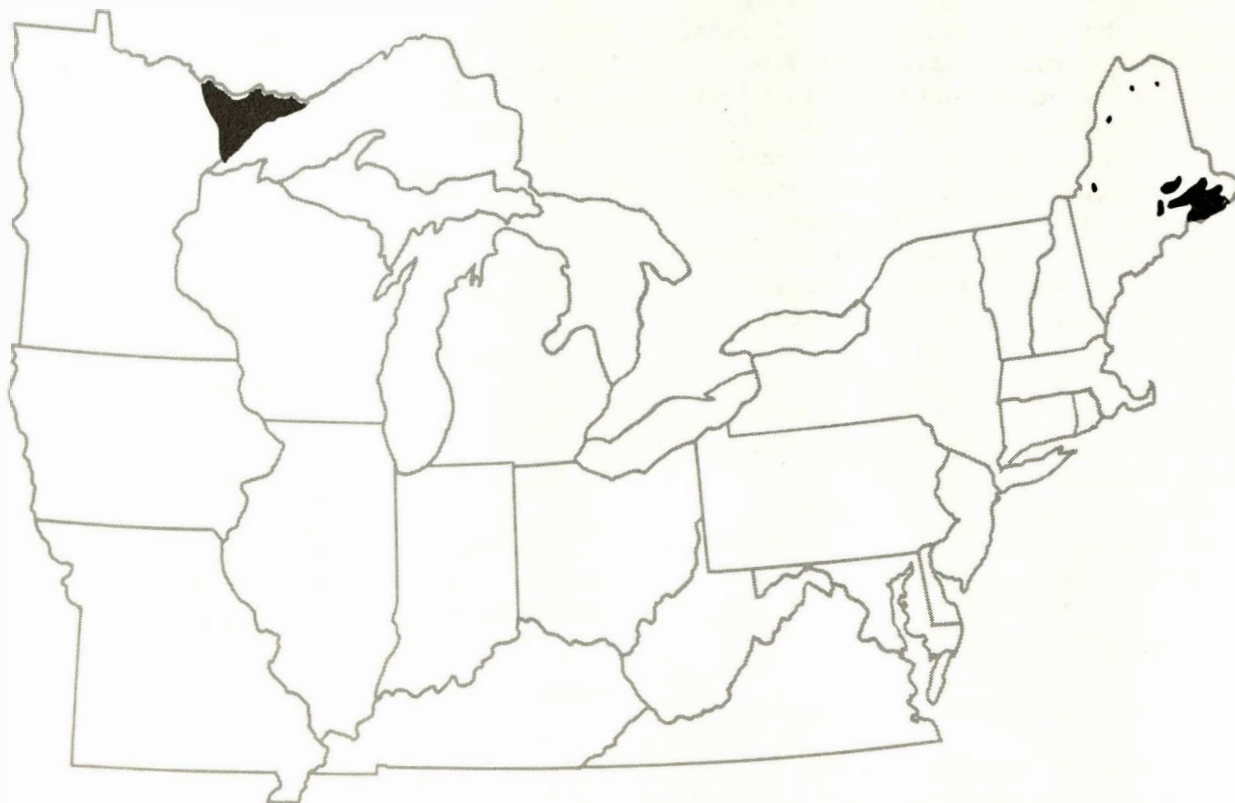
The spruce budworm (Choristoneura fumiferana) defoliated just over 1 million acres in 1986. Spruce budworm defoliation has not been this low since 1970. This downward trend began in Maine in 1982 and in New Hampshire and Vermont in 1984.

Minnesota was the only State that reported an increase in detectable defoliation. Minnesota was also the only State predicting an increase in defoliation during 1987.

Acres of aerially detected defoliation caused by the spruce budworm during 1985 and 1986

State	1985	1986
Maine	4,800,000	600,000
Michigan	93,800	1,500
Minnesota	307,300	440,000
New Hampshire	0	0
New York	300	0
Vermont	0	0
Wisconsin	15,000	0
Total	5,216,400	1,041,500

1986 Spruce Budworm Defoliation



Mountain Pine Beetle

Mountain pine beetle (Dendroctonus ponderosae) activity remained high. Outbreaks covered 3.45 million acres in 1986 compared to 3.34 million acres in 1985 and 3.3 million acres in 1984.

The size of the outbreaks increased in Idaho, New Mexico, Oregon, Utah, and Washington. The largest increase occurred in lodgepole pine stands in south-central Oregon.

Acres of mountain pine beetle outbreaks during 1985 and 1986

State	1985	1986
Arizona	100	50
California	20,000	20,000
Colorado	260,000	159,500
Idaho	27,000	34,700
Montana	933,000	867,000
New Mexico	900	2,000
Oregon	1,400,000	1,600,000
South Dakota	7,000	4,640
Utah	477,000	560,400
Washington	100,000	157,000
Wyoming	115,000	44,870
Total	3,340,000	3,450,160

1986 Mountain Pine Beetle Outbreak



Western Spruce Budworm

In 1986, the amount of defoliation caused by the western spruce budworm (*Choristoneura occidentalis*) exceeded 13 million acres--a record for this insect pest. The 13.2 million acres reported in 1986 broke the previous record of 12.8 million defoliated acres reported in 1985.

More than 80 percent of the defoliation occurred in three States: Oregon, Idaho, and Montana. Oregon again reported a large increase: up 1 million acres to 5.6 million acres in 1986. And--for the fifth year in a row--both Montana and Idaho reported defoliation on more than 2 million acres.

Acres of aerially detected defoliation caused by the western spruce budworm during 1985 and 1986

State	1985	1986
Arizona	102,640	86,480
California	0	0
Colorado	1,567,000	1,080,000
Idaho	2,631,300	2,916,900
Montana	2,675,000	2,497,000
New Mexico	529,484	382,936
Oregon	4,567,390	5,600,000
Utah	87,600	95,600
Washington	415,290	400,000
Wyoming	220,500	164,500
Total	12,796,204	13,223,416

1986 Western Spruce Budworm Defoliation



Disease Conditions in the East

In the South, fusiform rust (Cronartium quercuum f. sp. fusiforme) continued to be the most damaging disease of southern pines, primarily loblolly and slash.

In fact, about 30 percent of all the loblolly and slash pine stands--or about 15.3 million acres--have at least 10 percent of the trees with galls on or within 12 inches of the main stem, which is the distance the fungus can grow to cause a damaging stem canker.

The infested acreage is listed on the accompanying table (page 10). These estimates are based on the most recent Forest Inventory Analysis (FIA) data for each State. This year, the estimate for Virginia was updated: affected acreage in that State rose from 45,516 acres reported in 1985 to 70,534 acres in 1986.

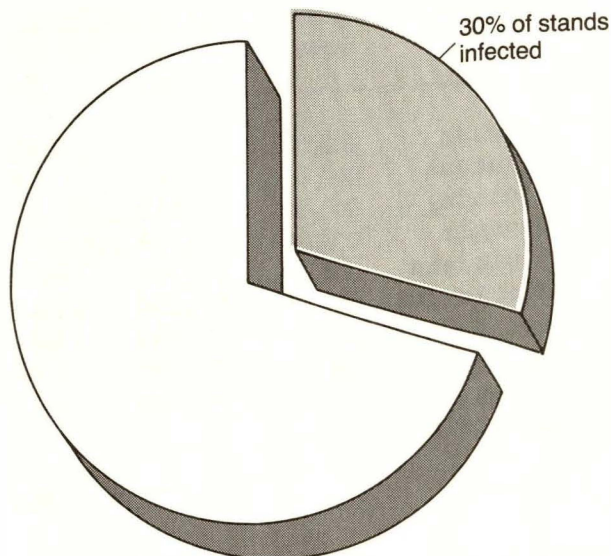
Overall annual losses for the five States of Florida, Georgia, North Carolina, South Carolina, and Virginia remained at about \$35 million.

These estimates are based on the most recent FIA data, growth projections, and economic models that estimate dollar losses. These losses are recalculated periodically: In 1986, the estimates were updated for Virginia and North Carolina. Dollar losses increased in Virginia from the \$45,000 reported in 1985 to \$350,000. But losses declined in North Carolina from \$3.2 million to \$2.5 million.

Annosus root disease (Heterobasidion annosum) continued to be a serious problem in the South. Deep, sandy soils with good internal drainage, which are classed as high-hazard soils for the disease, occur on about 20 percent of the South's land base.

The South also reported hardwood decline and mortality, particularly oak decline. Contributing factors were insect defoliation and environmental stress. The droughts of 1985 and 1986

Slash and Loblolly Pines Infected With Fusiform Rust



may cause a continued decline of affected species in 1987.

Finally, needle casts of pine occurred throughout the South. In fact, 1986 was reportedly one of the worst years for needle casts in recent history.

In the Northeast during 1986, decline and mortality again affected several tree species, especially ash, beech (beech bark disease), elm (Dutch elm disease), larch, maple, oak, spruce, and fir. Except for elm and beech, environmental stress coupled with pest activity appeared to be contributing to many of the decline problems. The possible effects of man-caused stress, such as atmospheric deposition, are being investigated.

Disease Conditions in the East

Status of fusiform rust during 1986 *

State	<u>Acres of host type infected by ownership</u>				Total
	National Forest	Other Federal	State	Private	
Alabama	61,900	20,100	20,100	1,938,900	2,041,000
Arkansas	6,500	1,200	800	50,400	58,900
Florida	6,210	10,856	25,159	1,006,814	1,049,039
Georgia	37,328	139,619	36,170	5,083,927	5,297,044
Louisiana	61,300	15,700	31,400	1,461,700	1,570,100
Mississippi	86,500	6,700	6,800	1,585,200	1,685,200
North Carolina **	3,854	8,716	25,769	1,100,716	1,139,055
South Carolina	73,081	60,093	35,937	1,700,040	1,869,151
Texas	36,500	1,300	1,400	461,800	501,000
Virginia	0	0	804	69,730	70,534
Total	373,173	264,284	184,339	14,459,227	15,281,023

Percent of host type infected by ownership ***

Florida	2	8	16	20	18
Georgia	52	49	46	58	57
North Carolina	9	17	30	32	31
South Carolina	27	54	55	49	48
Virginia	0	0	4	4	4

Annual dollar losses in hosts by State ****

	<u>Mortality</u>		<u>Quality loss</u>		
	<u>(cordwood)</u>		<u>(sawtimber)</u>		
	Loblolly	Slash	Loblolly	Slash	
Florida	823,000	490,000	340,000	1,130,000	2,783,000
Georgia	8,728,000	3,778,000	7,980,000	3,200,000	23,686,000
North Carolina	1,173,000	0	1,336,000	0	2,509,000
South Carolina	3,464,000	227,000	1,751,000	49,000	5,491,000
Virginia	16,000	0	344,000	0	350,000
Total	14,204,000	4,495,000	11,741,000	4,379,000	34,819,000

* Slash and loblolly pines having at least 10 percent or more of the trees infected on their main stems or within 12 inches of their main stems.

** Comparison of changes in fusiform rust incidence in North Carolina between 1974-84 showed that the disease increased in intensity and in acres affected at a rate of about 2 percent per year in the high-hazard areas while remaining constant or declining slightly in the low-hazard areas.

*** Data provided only for five States.

**** Data provided only for five States. Values stated in present value terms, discounted at 4 percent.

Disease Conditions in the West

In the West, dwarf mistletoes (*Arceuthobium* spp.) infected most western conifers on about 22 million acres of commercial forest land. However, most of the volume lost from reduced growth and mortality is caused by only 7 of the 16 species of dwarf mistletoe: those on lodgepole pine, Douglas-fir, western larch, true firs, western hemlock, and the two species on ponderosa pine.

The damaging effects of these parasitic plants are much reduced on regenerated stands when the infected overstory trees are removed. The damage increases, however, when infected overstory trees remain to reinfect the next stand.

Along with the dwarf mistletoes, the root diseases were the most damaging pest problems in the West. They cause outright tree mortality, butt rot, and growth loss and predispose trees to insect attack and windthrow.

Recent surveys in Montana and northern Idaho, for example, showed the annual mortality rate attributed to root diseases to be about 2 to 4 percent in diseased stands. In another instance, laminated root rot in Oregon and Washington has removed an estimated 5

Average annual losses caused by dwarf mistletoes

State	Acres infested	Cubic feet lost
Alaska	1,500,000	11,000,000
Arizona *	1,040,000	8,140,000
California	2,200,000	120,000,000
Colorado *	638,000	5,800,000
Idaho	3,224,000	42,280,000
Montana	2,416,000	33,250,000
Nevada	62,000	580,000
New Mexico *	1,140,000	16,570,000
Oregon	4,885,000	76,560,000
Utah	461,000	4,750,000
Washington	3,575,000	55,440,000
Wyoming *	637,000	8,250,000
Total	21,778,000	382,620,000

* National Forest lands only.

percent of the Douglas-fir type west of the Cascades from full production. The total acreage of Douglas-fir type infested may actually be as high as 10 percent.

Average annual root disease-caused mortality

Region	Acres affected *	Cubic feet of mortality		Total volume
		National Forest	Other	
Northern Region	3,300,000	54,400,000	26,300,000	80,700,000
Rocky Mountain Region	38,000	127,000 **	NA ***	127,000
Southwestern Region	1,140,000	2,900,000	1,860,000	4,760,000
Intermountain Region	56,000	1,400,000	215,000	1,615,000
Pacific Southwest Region	8,133,000	12,298,000	7,100,000	19,398,000
Pacific Northwest Region	2,220,000	51,453,000	80,478,000	131,931,000
Total	14,887,000	122,578,000	115,953,000	238,531,000

* Area where root diseases are a management concern.

** A partial estimate for subalpine fir in spruce-fir type only.

*** NA = data not available.

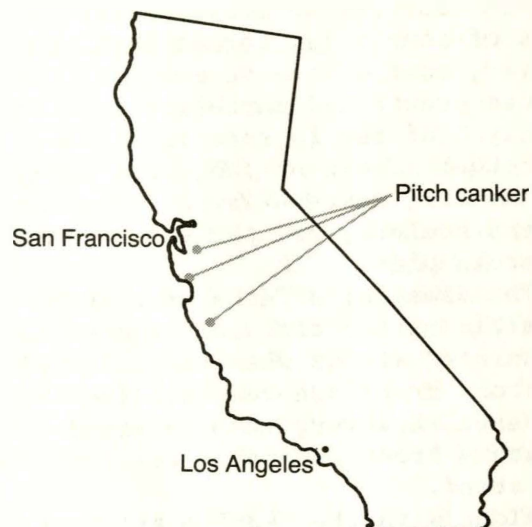
Furthermore, root diseases will be especially serious in the future because, if ignored, they persist throughout the stand rotation and will carry over and intensify from one rotation to the next.

Other important conifer diseases included foliage diseases, whose incidence was widespread and locally severe--except in Oregon and Washington where it was low relative to other years; stem decay, which continued to cause considerable damage in old-growth stands; and stem rust diseases, of which white pine blister rust had the greatest timber management implications.

White pine blister rust (Cronartium ribicola) severely impacts sugar pine and western white pine. In Oregon, Washington, Montana, and northern Idaho, use of site hazard rating techniques and genetically resistant planting stock have allowed greater flexibility in managing the valuable western white pine timber resource. So far, these techniques have proven less applicable in California.

In a new development, pitch canker (Fusarium moniliforme var. subglutinans), a damaging disease in the South, was found for the first time on three pine species in the central coastal area of California. For more information, see page 47.

Pitch Canker Reported in California



Part 2. Regional Conditions

Northern Region--Insects

Prepared by Scott Turnock

Northern Region—Status of insects in Montana, northern Idaho, North Dakota, northwestern South Dakota, and National Park Service lands in northwestern Wyoming

Insect	Host	Location	Remarks
Balsam woolly adelgid <u>Adelges piceae</u>	Grand fir, subalpine fir	Idaho	Damage in 1986 was still confined to "frost pockets" with a high component of subalpine fir on the Palouse Ranger District, Clearwater National Forest, and adjacent private land. An impact survey showed that 15 percent of the subalpine fir was killed in nine infested areas. In one area, 5 percent of the grand fir saplings were killed. Adelgids reduced the growth of subalpine fir but did not affect growth in grand fir—probably because the population level on grand fir was low.
Black pineleaf scale <u>Nuculaspis californica</u>	Ponderosa pine	Idaho	Damage continued along the Clearwater River drainage west of Orofino, but at a lower level than in 1985.
Cranberry girdler moth <u>Chrysoteuchia topiaria</u>	Douglas-fir, western larch	Idaho	Girdler moth populations have been monitored annually since 1981 at the Forest Service Nursery in Coeur d'Alene. A spray program was started in 1984. At peak moth emergence on July 18, 1986, an average of 6.4 male moths were caught in pheromone traps. In sprayed 2-0 Douglas-fir seedbeds, an average of 0.7 percent of the seedlings had their tap roots damaged. In unsprayed 3-0 Douglas-fir and 2-0 western larch seedbeds, damage averaged 2.7 and 0.2 percent, respectively.
Douglas-fir beetle <u>Dendroctonus</u> <u>pseudotsugae</u>	Douglas-fir	Idaho, Montana	The infested area increased from more than 3,500 acres in 1985 to 4,300 acres in 1986, and the Douglas-fir beetle killed 6,300 trees. Major damage occurred in Montana on the West Fork Ranger District, Bitterroot National Forest, and the Hungry Horse Ranger District, Flathead National Forest. In Idaho, damage was most evident on the Nezperce National Forest—especially on the Salmon River and Selway Ranger Districts—and on private lands southwest of Clarkia.

Northern Region--Insects

Northern Region—Status of insects in Montana, northern Idaho, North Dakota, northwestern South Dakota, and National Park Service lands in northwestern Wyoming—Continued

Insect	Host	Location	Remarks
Douglas-fir tussock moth <u>Orygia pseudotsugata</u>	Douglas-fir, spruce, true firs	Idaho, Montana	<p>For the first time since 1974, visible defoliation was detected on 3,386 acres near Potlatch, ID. Scattered areas of grand fir defoliation were found along the Harvard Deary Highway and just south of Mineral Mountain. However, because insect populations did not reach epidemic levels over a large area, only 1,930 acres were treated with the virus TM Biocontrol-1.</p> <p>Pheromone trap catches in 1986 were well below the 1985 level. Trap sites with over 50 moths per trap decreased from 28 sites in 1985 to 10 sites in 1986. Populations are expected to decline in 1987, and no visible defoliation is anticipated.</p>
Fir engraver <u>Scolytus ventralis</u>	Grand fir, subalpine fir	Idaho	Damage increased in 1986: Over 2,000 acres contained more than 4,000 faders (trees attacked and killed in 1985). Most of these newly killed trees were detected on the west half of the St. Joe National Forest and on private land.
Forest tent caterpillar <u>Malacosoma disstria</u>	Hardwoods	Idaho, Montana	Defoliation was heavy during 1985 and 1986 in parts of Montana; in the Missoula area, alder, aspen, willow, cottonwoods, and other ornamental trees were defoliated. In Idaho, alder and other hardwoods were defoliated east of Coeur d'Alene.
Gouty pitch midge <u>Cecidomyia pinipinapis</u>	Ponderosa pine	Idaho	Heavy tip damage occurred again at the Lone Mountain test plantation near Rathdrum. Damage extended from Coeur d'Alene north to Sandpoint.

Northern Region --Insects

Northern Region—Status of insects in Montana, northern Idaho, North Dakota, northwestern South Dakota, and National Park Service lands in northwestern Wyoming—Continued

Insect	Host	Location	Remarks
Gypsy moth <u>Lymantria dispar</u>	Conifers, hardwoods	Idaho, Montana, Wyoming	Two male moths were caught in pheromone-baited traps distributed by the Forest Service in 1986. One moth was caught near Fishing Bridge in Yellowstone National Park, WY. The other was caught in Sandpoint, ID. This is the first time a male moth has been trapped in Idaho. Montana reported capturing two moths—one near Missoula and the other near Bozeman.
Hemlock sawfly <u>Neodiprion tsugae</u>	Engelmann spruce, subalpine fir, western hemlock	Idaho	Heavy defoliation continued for the second year in the northern tip of Idaho. In 1986, 19,248 acres were infested north of Priest Lake and west of Porthill near the Canadian border. In some stands, western hemlock has been killed or top-killed.
Larch casebearer <u>Coleophora laricella</u>	Western larch	Idaho, Montana	Defoliation was light during 1986. Extremely early bud development and subsequent frosts may have caused casebearer mortality.
Lodgepole terminal weevil <u>Pissodes terminalis</u>	Lodgepole pine	Montana	Lodgepole terminal weevil surveys were continued for a third year. In 1986, 11 randomly selected stands of lodgepole pine regeneration, at least 10 years old, were sampled on the Tally Lake Ranger District, Flathead National Forest. Up to 59 percent of the trees sampled had been attacked by terminal weevil. Mortality varied from 1 to more than 11 percent of the terminal shoots. Surveys will continue to determine impacts of this pest on lodgepole pine volumes over a rotation.

Northern Region--Insects

Northern Region—Status of insects in Montana, northern Idaho, North Dakota, northwestern South Dakota, and National Park Service lands in northwestern Wyoming—Continued

Insect	Host	Location	Remarks
Mountain pine beetle <u>Dendroctonus ponderosae</u>	Lodgepole pine, ponderosa pine, other pines	Idaho, Montana	<p>Mountain pine beetle infestations decreased slightly. In 1986, infestations occurred on approximately 883,000 acres: 867,000 acres in Montana and 16,000 acres in northern Idaho.</p> <p>There were 831,777 acres of lodgepole pine containing 3.4 million faders; 42,261 acres of ponderosa pine with 26,000 faders; and 8,780 acres of white and whitebark pines with about 4,000 faders.</p> <p>In lodgepole pine, a slight increase in the number of acres infested occurred within the Flathead, Lolo, Helena, and Lewis and Clark National Forests in Montana. Infestations in lodgepole pine decreased elsewhere throughout the State.</p> <p>The only significant damage to lodgepole pine stands in northern Idaho was on the Nezperce National Forest. Nevertheless, this infestation decreased somewhat: About 6,000 acres contained over 9,000 faders.</p> <p>Increases in ponderosa pine mortality occurred on the Bitterroot, Flathead, Helena, and Lolo National Forests in Montana and on the Northern Cheyenne Indian Reservation. Elsewhere in Montana, beetle-caused mortality in ponderosa pine remained static or declined in 1986.</p>
Pine engraver <u>Ips pini</u>	Pine	Idaho, Montana	<p>The number of trees killed by this beetle decreased to 2,000 pines in 1986 compared with 3,700 pines in 1985. Two of the heaviest hit areas were in northern Idaho: On the Mica State Forest, 525 faders were detected; and on the western half of the St. Joe National Forest, there were 930 faders.</p>

Northern Region -- Insects

Northern Region--Status of insects in Montana, northern Idaho, North Dakota, northwestern South Dakota, and National Park Service lands in northwestern Wyoming--Continued

Insect	Host	Location	Remarks
Pine looper <u>Nacophora mexicana</u>	Ponderosa pine	Montana	In 1985, this looper heavily defoliated over 3,200 acres in the Ekalaka Hills, Sioux Ranger District, Custer National Forest. Although defoliation was negligible in 1986, the 1985 defoliation caused widespread tree mortality, especially in the understory. Very few viable pupae were found in the fall of 1986.
Pine needle sheathminer <u>Zelleria hainbachi</u>	Limber pine, lodgepole pine, ponderosa pine	Montana	Defoliation has been widespread throughout Montana for the past several years. Heaviest defoliation in 1986 was in lodgepole pine stands on the west side of Glacier National Park extending west into the Flathead National Forest.
Spruce beetle <u>Dendroctonus</u> <u>rufipennis</u>	Engelmann spruce, other spruce	Idaho, Montana	The only place in Montana that had more than a few infested trees was on the Flathead National Forest, which had 156 faders. In Idaho, the Nezperce National Forest had 228 faders.
Western balsam bark beetle <u>Dryocoetes confusus</u>	Subalpine fir	Idaho, Montana	This beetle is a chronic pest in subalpine fir stands that have a high incidence of root disease. Most damage occurs in Montana. In 1986, 4,500 trees were killed by the beetle; most of this mortality was on the Gallatin National Forest.
Western pine shoot borer <u>Eucosma sonomana</u>	Ponderosa pine	Idaho, Montana	This borer continued to cause growth loss in susceptible pine plantations. Infestation rates exceeding 50 percent of the terminal shoots have been noted.

Northern Region--Insects

Northern Region--Status of insects in Montana, northern Idaho, North Dakota, northwestern South Dakota, and National Park Service lands in northwestern Wyoming--Continued

Insect	Host	Location	Remarks
Western spruce budworm <u>Choristoneura</u> <u>occidentalis</u>	Douglas-fir, Engelmann spruce, true firs, western larch	Idaho, Montana, Wyoming	Defoliation decreased from 2.7 million acres in 1985 to 2.5 million acres in 1986: 2,497,000 acres were defoliated in Montana; 12,000 acres in northern Idaho; and 8,000 acres in Yellowstone National Park in northwestern Wyoming. Big increases in the area of defoliation occurred in Montana: On the Deerlodge National Forest, the area defoliated went from 326,300 acres in 1985 to 502,000 acres in 1986; and on the Helena National Forest, the area defoliated went from 757,000 acres in 1985 to 826,200 in 1986.
Whitebanded ash bark beetle <u>Hylesinus</u> spp.	Green ash	North Dakota	This beetle was found killing trees throughout much of North Dakota; street trees in Bismarck, Minot, and other cities were infested, as were shelterbelt trees near Mohall. Green ash mortality is expected to continue in 1987.

Northern Region--Diseases

Prepared by James W. Byler

Northern Region--Status of diseases in Montana, northern Idaho, North Dakota, northwestern South Dakota, and National Park Service lands in northwestern Wyoming

Disease	Host	Location	Remarks
STEM AND BRANCH DISEASES			
Atropellis canker <u>Atropellis piniphila</u>	Lodgepole pine	Idaho, Montana	Atropellis canker was common in large poles and sawtimber. It was most common in northern Idaho and Montana, where it caused defect and some mortality.
Comandra blister rust <u>Cronartium comandrae</u>	Lodgepole pine, ponderosa pine	Idaho, Montana	Comandra rust was abundant on lodgepole and ponderosa pines in many parts of Idaho and Montana and was locally damaging. It was especially severe on the Beaverhead National Forest in Montana.
Cytospora canker of fir <u>Valsa abietis</u> [<u>Cytospora abietis</u>]	Douglas-fir	Idaho	Severe damage to Douglas-fir saplings occurred on the Elk City and Selway Ranger Districts. Cytospora cankers developed on saplings damaged by hail. As many as three-fourths of the trees in some Douglas-fir plantations were dead or dying.
Diplodia blight <u>Sphaeropsis sapinea</u> (= <u>Diplodia pinea</u>)	Ponderosa pine	Idaho, Montana	In recent years, the pathogen has been associated with branch dieback. Damage has been especially severe near Polson, MT, and along the west shore of Flathead Lake. Damage continued in 1986, and tree mortality occurred.
Dwarf mistletoes <u>Arceuthobium americanum</u>	Lodgepole pine	Idaho, Montana	Dwarf mistletoes infested about 3.1 million acres: 713,000 acres in northern Idaho and 2,416,000 acres in Montana. Nearly 47 million cubic feet of growth (13,420,000 cubic feet in northern Idaho and 33,250,000 cubic feet in Montana) are lost annually on lands of all ownerships. The pathogens have been controlled on most regenerated stands. Damage has increased on some partially cut stands.
<u>Arceuthobium douglasii</u>	Douglas-fir	Idaho, Montana	
<u>Arceuthobium laricis</u>	Western larch	Idaho, Montana	
Stem decays <u>Phellinus pini</u> <u>Echinodontium tinctorium</u> Others	Various conifers	Idaho, Montana	Decays caused large economic losses. <u>Phellinus pini</u> decay resulted in the culling of many lodgepole pine logs at a log home manufacturing business in the Bitterroot Valley in western Montana.

Northern Region--Diseases

Northern Region—Status of diseases in Montana, northern Idaho, North Dakota, northwestern South Dakota, and National Park Service lands in northwestern Wyoming—Continued

Disease	Host	Location	Remarks
Western gall rust <u>Endocronartium</u> <u>harknessii</u>	Lodgepole pine, ponderosa pine, Scotch pine	Idaho, Montana, North Dakota	This disease was common on hard pines. Damage was sometimes severe enough to be a management concern.
White pine blister rust <u>Cronartium</u> <u>ribicola</u>	Western white pine	Idaho, northwestern Montana	White pine blister rust precluded the management of western white pine on high-hazard sites and caused extensive tree mortality throughout the range of western white pine. More rust-resistant white pine is being planted as seed becomes available.
ROOT DISEASES			
Amnosus root disease <u>Heterobasidion</u> <u>amosum</u>	Douglas-fir, grand fir, ponderosa pine, subalpine fir, western hemlock	Idaho, western Montana	Root diseases were concerns on about 1.9 million acres in northern Idaho and 1.4 million acres in Montana (about 15 percent of the Region's commercial forest land). Results from permanent plots re-examined in 1985 and 1986 indicated that root disease-caused losses can be high: —In four 100-year-old stands in north Idaho, 30 percent of the trees and 27 percent of the volume were killed by root diseases during a 12-year period (3.3 trees/acre/year). —Annual mortality rates for Douglas-fir in diseased 60- to 100-year-old stands were about 4 percent. Mortality rates for grand fir were about 2.5 percent. —Annual mortality rates in diseased 10- to 25-year-old stands were 2 to 4 percent (7-10 trees/acre/year in stands averaging 200-300 trees/acre).
Armillaria root disease <u>Armillaria</u> spp.	Douglas-fir, other conifers	Idaho, Montana	
Black stain root disease <u>Ceratocystis</u> <u>wageneri</u> [<u>Verticicladiella</u> <u>wageneri</u>]	Douglas-fir, lodgepole pine, ponderosa pine	Idaho, Montana	
Laminated root rot <u>Phellinus</u> <u>weirii</u>	Douglas-fir, grand fir, western redcedar, other conifers	Idaho, Montana	
Schweinitzii butt rot <u>Phaeolus</u> <u>schweinitzii</u>	Douglas-fir, other conifers	Idaho, Montana	
FOLIAGE DISEASES			
Dothistroma needle blight <u>Mycosphaerella</u> <u>pini</u> [<u>Dothistroma</u> <u>septospora</u> (= <u>Dothistroma</u> <u>pini</u>)]	Austrian pine, lodgepole pine, ponderosa pine	Idaho, Montana	Although still evident around the Wilderness Gateway Campground, Clearwater National Forest, ID, the disease was less noticeable than in previous years.

Northern Region--Diseases

Northern Region—Status of diseases in Montana, northern Idaho, North Dakota, northwestern South Dakota, and National Park Service lands in northwestern Wyoming—Continued

Disease	Host	Location	Remarks
Douglas-fir needle cast <u>Rhabdocline pseudotsugae</u> <u>Rhabdocline weirii</u>	Douglas-fir	Idaho, Montana	Incidence was widespread, but damage was usually light. Severe damage to seedlings occurred at a tree improvement test site on the Sandpoint Ranger District, Idaho Panhandle National Forests.
Elytroderma disease <u>Elytroderma deformans</u>	Ponderosa pine	Idaho, Montana	The disease remained severe in a number of pine stands, especially in the Bitterroot Valley, Flathead Indian Reservation, and around Flathead Lake in Montana.
Larch needle blight <u>Hypodermella laricis</u> Larch needle cast <u>Meria laricis</u>	Western larch	Idaho, Montana	Except in local areas, incidence of both needle diseases was low.
Needle cast of lodgepole pine <u>Lophodermella montivaga</u>	Lodgepole pine	Montana	The pathogen severely defoliated high-elevation stands in Yellowstone National Park and adjacent stands on the Gallatin National Forest.
Swiss needle cast <u>Phaeocryptopus gaeumannii</u>	Douglas-fir	Idaho, Montana	In Montana, this needle cast was serious in harvested wild Christmas trees on the Fortine Ranger District, Kootenai National Forest, and was also present on the Flathead National Forest.
White pine needle cast <u>Lecanosticta</u> sp.	Western white pine	Idaho, Montana	The disease continued on Bonners Ferry Ranger District, Priest River Experimental Forest, and Wallace Ranger District in Idaho and on the Yaak Ranger District in Montana.
VASCULAR WILTS			
Dutch elm disease <u>Ceratocystis ulmi</u>	American elm, Siberian elm	Montana, North Dakota	Dutch elm disease was confirmed on additional sites in North Dakota.
NURSERY DISEASES			
Diplodia blight <u>Sphaeropsis sapinea</u> (= <u>Diplodia pinea</u>)	Ponderosa pine	Idaho	The disease was severe on 1-0 ponderosa pine in a north Idaho nursery.

Northern Region--Diseases

Northern Region—Status of diseases in Montana, northern Idaho, North Dakota, northwestern South Dakota, and National Park Service lands in northwestern Wyoming—Continued

Disease	Host	Location	Remarks
Fusarium root rot <u>Fusarium</u> spp.	Douglas-fir, other conifers	Idaho, Montana	A recurring problem in most nurseries throughout the Region. The rot and tip dieback was most serious on Douglas-fir but was also present on Engelmann spruce, true firs, western larch, and several pine species. Damage was especially common on containerized stock.
Gray mold <u>Botrytis cinerea</u>	Engelmann spruce, lodgepole pine, western larch	Idaho, Montana	Losses were evident in container-grown seedlings of western larch, lodgepole pine, and Engelmann spruce at nurseries throughout the Region. The fungus was also found on bareroot true firs in private nurseries near Bonners Ferry in Idaho.
Heat/fungicide damage	Western larch	Idaho, Montana	Extensive damage occurred to containerized western larch at several nurseries when a sharp temperature increase occurred shortly after sowing in May. The unexpected temperature increase may have caused phytotoxic effects from the fungicide applications.
Phoma blight <u>Phoma</u> spp.	Most conifers	Idaho	Tip blight associated with <u>Phoma</u> species occurred at several nurseries.
Sirococcus tip blight <u>Sirococcus strobilinus</u>	Engelmann spruce, ponderosa pine	Idaho, Montana	Sirococcus tip blight continued to cause damage at several nurseries in northern Idaho. The fungus was also confirmed on bareroot ponderosa and lodgepole pines at a western Montana nursery.
OTHER			
Winter damage	Douglas-fir, ponderosa pine, other conifers	Montana	Extensive foliage injury and some tree mortality occurred both east and west of the Continental Divide. Subalpine fir Christmas trees were rendered unsaleable in Eureka, MT.

Rocky Mountain Region--Insects

Prepared by Gene Lessard

Rocky Mountain Region--Status of insects in Colorado, Kansas, Nebraska, South Dakota, and central and eastern Wyoming

Insect	Host	Location	Remarks
Ash borer/lilac borer <u>Podosesia syringae</u>	Green ash	South Dakota	One shelterbelt was heavily infested (50 trees on 3 acres) in Brule County.
Cankerworms <u>Alsophila pometaria</u> <u>Paleacrita vernata</u>	Elm, hackberry, honeylocust	Kansas, South Dakota	Cankerworm damage was again severe in the eastern half of Kansas. Light damage was noted in South Dakota.
Cedar bark beetles <u>Phloeosinus</u> spp.	Eastern redcedar, Rocky Mountain juniper	Nebraska	An outbreak in central Nebraska caused significant damage to juniper and redcedar windbreaks.
Coneworms <u>Diorcetrus</u> spp.	Ponderosa pine, Scotch pine	Nebraska, South Dakota	A problem in South Dakota and Nebraska.
Douglas-fir beetle <u>Dendroctonus</u> <u>pseudotsugae</u>	Douglas-fir	Colorado, Wyoming	Mortality continued primarily in Colorado.
Douglas-fir tussock moth <u>Orgyia pseudotsugata</u>	Douglas-fir, spruce	Colorado	Light defoliation occurred in the Rampart Range/Platte River drainage. Long-term plots are being established to monitor population changes and resultant damage to host species. Adult trapping indicated a static, endemic population during 1985-86.
Eriophyid mites		Colorado	Vagrant forms of eriophyid mites were again found in large numbers on "all" hosts. They appeared to be causing a wide range of leaf injury. Symptoms ranged from total browning/death of leaves to curling and discoloration.
European pine sawfly <u>Neodiprion sertifer</u>	Pine	Kansas	Pine sawflies were reported in a number of Christmas tree plantations in northwestern Kansas. In the past, the pine sawfly problem was mainly limited to the extreme eastern part of Kansas, near Kansas City.
Gypsy moth <u>Lymantria dispar</u>	Hardwoods	Colorado, Kansas, South Dakota	For the first time since 1982, South Dakota found no gypsy moths in its annual trapping program. No gypsy moths were trapped in Kansas. In Colorado, traps in Boulder and Fort Collins captured 46 and 56 adults, respectively.

Rocky Mountain Region--Insects

Rocky Mountain Region--Status of insects in Colorado, Kansas, Nebraska, South Dakota, and central and eastern Wyoming--Continued

Insect	Host	Location	Remarks
Honeysuckle aphid <u>Hyadaphis tartaricae</u>	Honeysuckle	South Dakota	Honeysuckle aphid was found in three new counties: Fall River, Custer, and Perkins. Only three counties in South Dakota have not reported the aphid: Harding, Butte, and Shannon. Permanent evaluation plots, established in 1984, showed an increase in extent and intensity of damage; mortality, however, was negligible. Overall, the older honeysuckle rows are still providing cover to the lower levels of the shelterbelts.
		Colorado	This aphid was found, for the first time, at the Colorado State Forest Service Nursery.
Introduced pine sawfly <u>Diprion similis</u>	Pine	South Dakota	The introduced pine sawfly was first found in eastern South Dakota in 1985. During 1986, an infestation was discovered in the provenance tests and shelterbelts at the Big Sioux Nursery. An evaluation determined that 61 percent of the overwintering (1986-87) cocoons were parasitized. Little damage was done in 1986, and little is expected in 1987.
Juniper sawfly <u>Monoctenus fulvus</u>	Juniper	Kansas	Severe juniper sawfly damage was observed in several windbreaks, but most of the damage was reported on ornamentals and recreation-area trees.
Large aspen tortrix <u>Choristoneura</u> <u>conflictana</u>	Aspen	Colorado	Several areas of moderate to severe defoliation occurred throughout Colorado. The most notable outbreaks occurred along the northwestern edge of North Park and in the Telluride area.

Rocky Mountain Region--Insects

Rocky Mountain Region--Status of insects in Colorado, Kansas, Nebraska, South Dakota, and central and eastern Wyoming--Continued

Insect	Host	Location	Remarks
Mountain pine beetle <u>Dendroctonus ponderosae</u>	Limber pine, lodgepole pine, ponderosa pine	Colorado, South Dakota, Wyoming	<p>The infestation in the Black Hills of South Dakota and Wyoming declined (0.6x). This infestation, which was at a 16-year low, is expected to increase in 1987.</p> <p>Elsewhere in Wyoming, populations on Casper and Muddy Mountains also declined in 1986. The Casper Mountain Pine Beetle Association has proposed a two-phase action plan that emphasizes stand management to reduce susceptibility to mountain pine beetle and wildfire.</p> <p>In Colorado, mountain pine beetle in lodgepole pine continued to decline (0.6x) in the High Country Project Area. Elsewhere, populations also declined in ponderosa pine on the Uncompahgre Plateau and Dolores River (about 0.6x). Markets currently limit the amount of stand management that is possible.</p> <p>Overall, the beetle infested 201,010 acres: 159,500 acres in Colorado; 36,870 acres in eastern Wyoming, and 4,640 acres in South Dakota. In 1985, 371,000 acres were infested throughout the Region. In 1986, about 214,890 trees were killed: 107,860 lodgepole pine and 33,330 ponderosa pine in Colorado; 30,790 lodgepole pine and 32,670 ponderosa pine in Wyoming; and 10,240 ponderosa pine in South Dakota.</p>
Nantucket pine tip moth <u>Rhyacionia frustrana</u>	Pine	Kansas	Damage was greatly reduced in northeastern Kansas but above normal in the south-central portion of the State.
Pine butterfly <u>Neophasia menapia</u>	Ponderosa pine	Colorado	Spotty populations continued to occur in southwestern Colorado.
Pine engravers <u>Ips</u> spp.	Ponderosa pine	Nebraska, South Dakota	In South Dakota, the <u>Ips</u> outbreak that began in 1984 in the Black Hills returned to endemic levels in 1986. In Nebraska, mortality occurred around thinning areas.

Rocky Mountain Region--Insects

Rocky Mountain Region—Status of insects in Colorado, Kansas, Nebraska, South Dakota, and central and eastern Wyoming—Continued

Insect	Host	Location	Remarks
Pine needle scale <u>Chionaspis pinifoliae</u>	Pine, spruce	South Dakota	Scattered trees with infestations in four counties in South Dakota.
Pine tip moths <u>Rhyacionia</u> spp.	Ponderosa pine, Scotch pine	South Dakota, Nebraska	Scattered infestations ranged from 1 to 50 infested trees. A problem in young pines throughout Nebraska.
Spruce beetle <u>Dendroctonus</u> <u>rufipennis</u>	Spruce	Colorado	Remained endemic. Low-level populations occurred in right-of-way decks, Sulphur Ranger District, Arapaho National Forest. However, the infested logs will probably be processed before the beetles mature.
Sugar pine tortrix <u>Choristoneura</u> <u>lambertiana</u>	Limber pine, ponderosa pine	Colorado, Wyoming	Defoliation declined in southwestern Colorado but remained static elsewhere in the State. For the first time in recent years, defoliation of limber pine was reported west of Lander, WY.
Walnut caterpillar <u>Datana integerrima</u>	Walnut	Kansas	Damage was almost nonexistent compared with previous years. Although trees were defoliated, few growers reported damage.
Western spruce budworm <u>Choristoneura</u> <u>occidentalis</u>	Douglas-fir, Engelmann spruce, white fir	Colorado, Wyoming	The area of visible defoliation continued to decline from 1.6 million acres in 1985 to 1.1 million acres in 1986. Defoliation occurred on 1,080,000 acres in Colorado and 20,000 acres in eastern Wyoming. Defoliation is expected to decline again in 1987. Despite the decline, several scattered areas were heavily defoliated.
Western tent caterpillar <u>Malacosoma</u> <u>californicum</u>	Aspen	Colorado	As predicted, populations in the chronically infested area southeast of Pagosa Springs continued to decline to nearly endemic levels. This outbreak, which began in 1977, reached a peak of 70,000 acres in 1983 and has left many dead and dying aspen.

Rocky Mountain Region--Diseases

Prepared by Diane Hildebrand

Rocky Mountain Region—Status of diseases in Colorado, Kansas, Nebraska, South Dakota, and central and eastern Wyoming

Disease	Host	Location	Remarks
STEM AND BRANCH DISEASES			
Comandra blister rust <u>Cronartium comandrae</u>	Lodgepole pine	Wyoming	Continued as the most serious disease of lodgepole pine on the Wind River Ranger District, Shoshone National Forest, where more than half the mature trees are infected and 85 percent of the infected trees have dead tops.
Dwarf mistletoes <u>Arceuthobium americanum</u>	Lodgepole pine	Colorado, Wyoming	These two dwarf mistletoes remained the most important diseases on Federal lands in the Region. Found on about 638,000 acres in Colorado and 361,000 acres in eastern and central Wyoming, they caused mortality and growth loss equal to approximately 10 million cubic feet (5,800,000 cubic feet in Colorado and 4,960,000 cubic feet in eastern Wyoming.)
<u>Arceuthobium vaginatum</u> subsp. <u>cryptopodum</u>	Ponderosa pine	Colorado	
			Presuppression surveys were conducted on 23,000 acres on three National Forests. Silvicultural control was conducted on 2,410 acres on eight National Forests.
			<u>A. vaginatum</u> infested approximately 20 percent of host type. Annual losses amounted to over 885,000 cubic feet. Most common in the <u>Pinus ponderosa/Muhlenbergia montana</u> habitat type.
Poplar cankers <u>Dothichiza populea</u> <u>Valsa sordida</u> [<u>Cytospora chrysosperma</u>] <u>Phomopsis macrospora</u>	Cottonwood, hybrid poplars, Lombardy poplar	South Dakota	Common Statewide.
Russian olive canker <u>Phomopsis</u> or <u>Tubercularia</u> sp.	Russian olive	South Dakota	During the last few years, this disease has caused mortality in shelterbelts. Incidence highest in areas affected by drought and grasshopper populations.
Siberian elm canker <u>Botryodiplodia hypodermia</u>	Siberian elm	South Dakota	Decline and death of elms continued throughout South Dakota. Herbicide damage suspected as one of the stress factors.

Rocky Mountain Region--Diseases

Rocky Mountain Region—Status of diseases in Colorado, Kansas, Nebraska, South Dakota, and central and eastern Wyoming—Continued

Disease	Host	Location	Remarks
<p><i>Thyronectria</i> canker <u><i>Thyronectria austro-</i></u> <u><i>americana</i></u></p>	Honeylocust	Colorado, Kansas	Continued as an urban tree problem along Front Range in Colorado and on windbreaks in Kansas.
ROOT DISEASES			
<p>Armillaria root disease <u><i>Armillaria</i> spp.</u></p>	Engelmann spruce, subalpine fir	Colorado	In Colorado, several hundred acres near Turquoise Lake and May Queen Campground on the Pike and San Isabel National Forest contained small centers of <u><i>Armillaria</i></u> .
FOLIAGE DISEASES			
<p>Anthracnoses, leaf spots <u><i>Gnomonia leptostyla</i></u> and unidentified species</p>	Hardwoods	Kansas, South Dakota	Wet, warm weather in parts of South Dakota favored these diseases. Walnut anthracnose was severe in eastern Kansas.
<p>Brown spot needle blight <u><i>Mycosphaerella</i></u> <u><i>dearnessi</i></u> (=<u><i>Scirrhia acicola</i></u>)</p>	Austrian pine, Scotch pine	Kansas	Isolated case on Austrian pine in Lyons County. Very common on Scotch pine.
<p>Diplodia blight <u><i>Sphaeropsis sapinea</i></u> (=<u><i>Diplodia pinea</i></u>)</p>	Austrian pine, ponderosa pine	Kansas, Nebraska, South Dakota	Present in shelterbelts in South Dakota. Severe infections for the last 5 years in eastern Nebraska have resulted in branch dieback and tree mortality in urban and windbreak plantings. In Kansas, spreading from ornamental plantings in cities to windbreaks and recreation plantings.
<p>Dothistroma needle blight <u><i>Mycosphaerella pini</i></u> [<u><i>Dothistroma septospora</i></u> (=<u><i>Dothistroma pini</i></u>)]</p>	Austrian pine	Nebraska	Caused extensive defoliation in many young pine plantings in eastern Nebraska.
<p>Ink spot, marssonina blight, and shepherd's crook <u><i>Ciborinia whetzelii</i></u> <u><i>Marssonina populi</i></u> <u><i>Venturia macularis</i></u> [<u><i>Pollaccia radios</i></u>]</p>	Aspen	Colorado	Warm, moist weather in the spring encouraged the buildup of aspen foliage diseases.

Rocky Mountain Region--Diseases

Rocky Mountain Region—Status of diseases in Colorado, Kansas, Nebraska, South Dakota, and central and eastern Wyoming—Continued

Disease	Host	Location	Remarks
Juniper blight <u>Cercospora sequoiae</u> <u>Kabatina juniperi</u> <u>Phomopsis juniperovora</u>	Eastern redcedar, Rocky Mountain juniper	Nebraska, South Dakota	Incidence increased in South Dakota. Caused serious problems in scattered areas of eastern Nebraska.
<u>Lophodermella concolor</u> <u>Lophodermella montivaga</u>	Lodgepole pine	Colorado	Collected on the Fraser Experimental Forest near Fraser. Also noted in areas near Winter Park and Granby.
<u>Leptomelanconium</u> <u>cinereum</u>	Lodgepole pine	Colorado	Infected last year's needles on about 100 acres of sapling and pole-size lodgepole in an area of mountain pine beetle mortality on the Holy Cross Ranger District, White River National Forest.
Needle casts of lodgepole pine Unidentified species	Lodgepole pine	Colorado	Various needle casts were widespread along the Front Range and on the Routt, Arapaho, and Pike and San Isabel National Forests. Incidence was probably due to weather conditions. This is the second year that needle casts have been observed.
Sirococcus tip blight <u>Sirococcus strobilinus</u>	Blue spruce	South Dakota	Present in shelterbelts.
VASCULAR WILTS Dutch elm disease <u>Ceratocystis ulmi</u>	Elm species, including American elm	Colorado, Nebraska, South Dakota	Remained top priority in Colorado's urban forests and a problem throughout Nebraska. In South Dakota, the disease continued to kill 6 to 10 percent of the remaining elms in communities without control programs.
NURSERY DISEASES Cytospora canker <u>Cytospora</u> spp.	Cottonwood, poplar	Colorado	At the Colorado State Forest Service Nursery, replacing coppice stumps with canker-resistant strains has helped alleviate the problem.
Phomopsis blight <u>Phomopsis juniperovora</u>	Eastern redcedar	Nebraska	Although 25 percent of the 2-0 <u>Juniperus</u> <u>virginiana</u> at Bessey Nursery were affected by the blight, immediate and regular spraying and roguing of infected foliage limited losses to 8 percent.

Rocky Mountain Region--Diseases

Rocky Mountain Region—Status of diseases in Colorado, Kansas, Nebraska, South Dakota, and central and eastern Wyoming—Continued

Disease	Host	Location	Remarks
Tip blight Causal agent unknown	Russian olive	South Dakota	For the past few years, Russian olive at Big Sioux Nursery has been damaged by a tip blight of unknown etiology. Several seedlots have shown symptoms, but regular applications of a pesticide and a few applications of Bordeaux mixture have kept the disease under control. <u>Fusarium acuminatum</u> was one potential pathogen isolated from blighted tissue. But when it was inoculated into seedlings, it did not cause a tip blight in top-pruned, 2-month-old seedlings.
OTHER			
Decline	Ponderosa pine	South Dakota	Ponderosa pine are recovering from unexplained decline and mortality of 20- to 80-year-old pines in shelterbelts in southeast South Dakota. Diplodia blight, fluctuating water tables, and infestation by pitch nodule makers were implicated.
Drought	Many species	South Dakota	Hot, dry winds damaged newly planted trees, especially conifers, in central South Dakota.
Herbicide damage	All species	South Dakota	Continued as a major problem in eastern South Dakota on windbreak and shelterbelt plantings adjacent to agricultural areas.
Frost damage	Hardwoods	Colorado, South Dakota	Late winter was unusually warm and dry, so some trees leafed out several weeks early. Late spring cold spells resulted in frost injury to many species.
Winter damage	Conifers, hardwoods	South Dakota	Several severe winter blizzards caused top breakage, blowdown, snow damage, winter burn, and winter kill—especially in eastern and southeastern South Dakota. Deep snows also forced rabbits and deer into shelterbelts: Some belts in Dewey, Ziebach, and Perkins Counties had virtually every tree girdled or severely nipped back.

Southwestern Region--Insects

Prepared by Terrence J. Rogers

Southwestern Region--Status of insects in Arizona and New Mexico

Insect	Host	Location	Remarks
Douglas-fir beetle <u>Dendroctonus</u> <u>pseudotsugae</u>	Douglas-fir	Arizona, New Mexico	Beetle-caused tree mortality increased in northern New Mexico in 1986. Mortality was greatest on the Carson National Forest and Taos Pueblo Indian Reservation in areas where several years of western spruce budworm defoliation had occurred. Elsewhere, mortality was widely scattered and minor.
Large aspen tortrix <u>Choristoneura</u> <u>conflictana</u>	Aspen	Arizona, New Mexico	Aspen defoliation in Arizona and New Mexico went from 13,560 acres in 1985 to 40,190 acres in 1986. Defoliation in 1986 resulted from a combination of causes, which included the large aspen tortrix, western tent caterpillar, and the fungus <u>Marssonina populi</u> . Extensive areas of defoliation occurred on the Carson and Santa Fe National Forests in New Mexico. Less extensive areas of defoliation were also detected on the Cibola and Lincoln National Forests in New Mexico and on the Apache-Sitgreaves and Kaibab National Forests, AZ.
Western tent caterpillar <u>Malacosoma</u> <u>californicum</u>			
Mountain pine beetle <u>Dendroctonus ponderosae</u>	Ponderosa pine	Arizona, New Mexico	Ponderosa pine mortality caused by the mountain pine beetle increased throughout northern New Mexico. Individual trees and groups of trees were killed on the Carson National Forest and on the adjacent Taos Pueblo Indian Reservation. Elsewhere, mortality was widely scattered and relatively minor. Infestations occurred on approximately 2,050 acres: 2,000 acres in New Mexico and 50 acres in Arizona. In 1985, about 1,000 acres were infested in both States.
Pandora moth <u>Coloradia pandora</u>	Ponderosa pine	Arizona	No visible defoliation was detected on the Kaibab National Forest or the Grand Canyon National Park in 1986. However, in 1985, a new infestation was found on 760 acres near Cape Royale on the North Rim of Grand Canyon National Park. Since this insect has a 2-year life cycle and is currently in the early larval stage, visible defoliation is expected to occur again in 1987.

Southwestern Region--Status of insects in Arizona and New Mexico--Continued

Insect	Host	Location	Remarks
Pine engravers <u>Ips</u> spp.	Pine	Arizona, New Mexico	<u>Ips</u> beetles continued to cause low levels of mortality throughout Arizona and New Mexico. Mortality of trees or groups of trees occurred on 2,435 acres. Mortality occurred on the Cibola, Lincoln, and Santa Fe National Forests, NM, and the Apache-Sitgreaves, Coconino, Prescott, and Tonto National Forests and the San Carlos and Fort Apache Indian Reservations, AZ.
Spruce beetle <u>Dendroctonus</u> <u>rufipennis</u>	Engelmann spruce	Arizona, New Mexico	Spruce beetle activity declined in 1986, but mortality continued on the Fort Apache Indian Reservation and adjacent Apache-Sitgreaves National Forest in Arizona and on the Carson National Forest in New Mexico. Spruce beetle on the Fort Apache Indian Reservation has killed over 150 million board feet of sawtimber since 1982.
True fir bark beetles <u>Scolytus</u> spp. Western balsam bark beetle <u>Dryocoetes confusus</u>	True firs	Arizona, New Mexico	Mortality caused by these true fir bark beetles was scattered. The heaviest concentrations occurred on the Carson and Santa Fe National Forests, NM, and on the Coconino National Forest, AZ.
Western pine beetle <u>Dendroctonus brevicomis</u>	Ponderosa pine	Arizona, New Mexico	Very little western pine beetle-caused tree mortality occurred in 1986.
Western spruce budworm <u>Choristoneura</u> <u>occidentalis</u>	Douglas-fir, spruce, white fir	Arizona, New Mexico	Budworm defoliation decreased from 632,124 acres in 1985 to 469,416 acres in 1986: 382,936 acres in New Mexico and 86,480 acres in Arizona. The largest areas of contiguous defoliation occurred on the Carson and Santa Fe National Forests, NM, and on the Kaibab National Forest and Grand Canyon National Park, AZ. Less extensive defoliation also occurred on the Cibola, Lincoln, and Gila National Forests and Mescalero-Apache Indian Reservation, NM, and Apache-Sitgreaves National Forest, AZ. Conservative estimates place the annual loss attributed to budworm at 3 to 5 million cubic feet, principally in northern New Mexico.

Southwestern Region--Diseases

Prepared by Helen Maffei

Southwestern Region--Status of diseases in Arizona and New Mexico

Disease	Host	Location	Remarks
STEM AND BRANCH DISEASES			
Aspen trunk rot <u>Phellinus tremulae</u>	Aspen	Arizona, New Mexico	<u>Phellinus tremulae</u> was responsible for the most common cull and defect in aspen. This white trunk rot, widespread throughout the host type, caused significant losses, especially in mature stands. Cull volumes may equal as much as 60 percent of the total volume.
Comandra blister rust <u>Cronartium comandrae</u>	Mondell pine, ponderosa pine	Arizona	Comandra blister rust occurred in the Payson and Prescott areas on exotic Mondell and the native ponderosa pines. Damage has been restricted to individual trees but the possibility exists that the disease may spread to nearby Christmas tree plantations.
Dwarf mistletoes <u>Arceuthobium</u> spp.	Douglas-fir, Engelmann spruce, ponderosa pine	Arizona, New Mexico	Dwarf mistletoe infestation caused a significant decrease in yield on commercial and noncommercial forest lands. Approximately 46 percent (2.2 million acres) of the total commercial acreage (4.8 million acres) was infested; losses in wood production may exceed 25 million cubic feet of commercial timber in New Mexico and Arizona. As a point of reference, the estimated total volume from commercial conifers is approximately 202 million cubic feet.
Fir broom rust <u>Melampsorella carvophyllacearum</u>	True firs	Arizona, New Mexico	Fir broom rust was widely distributed in subalpine, corkbark, and white firs and caused occasional top breakage.
Powell limb rust <u>Peridermium filamentosum</u>	Ponderosa pine	Arizona	Powell limb rust was found in mature and overmature ponderosa pine in scattered locations on the Fort Apache Indian Reservation. The disease caused minor damage to infected trees and was mainly a concern when identifying leave and seed trees in infected stands.

Southwestern Region --Diseases

Southwestern Region--Status of diseases in Arizona and New Mexico--Continued

Disease	Host	Location	Remarks
Red ring rot <u>Phellinus pini</u>	Douglas-fir, ponderosa pine, spruce, true firs	Arizona New Mexico	<u>Phellinus pini</u> is indigenous to mature and overmature stands of pine and mixed conifers. Scattered in distribution; losses and damage were minimal in most stands. It has also been found on immature pine and mixed conifers in suppressed conditions.
Rust-red stringy rot <u>Echinodontium tinctorium</u>	Spruce, true firs	Arizona, New Mexico	This fungus was scattered in mature and overmature stands of mixed conifers but caused insignificant losses.
Spruce broom rust <u>Chrysomyxa arctostaphyli</u>	Spruce	Arizona, New Mexico	Spruce broom rust was scattered throughout the host type but was of little commercial significance.
Stem cankers <u>Cenangium singulare</u> <u>Ceratocystis fimbriata</u> <u>Cryptosphaeria populina</u> <u>Hypoxyylon mammatum</u>	Aspen	Arizona, New Mexico	Canker fungi caused significant reductions in the yield of mature aspen stands. Damage included tree mortality from girdling cankers, top breakage, cull, and decay. Many stands have over 30-percent infection with one or more of these stem canker fungi.
ROOT DISEASES			
Annosus root disease <u>Heterobasidion annosum</u>	Douglas-fir, ponderosa pine, spruce, true firs	Arizona, New Mexico	In Arizona and New Mexico, root and butt rot pathogens were responsible for an approximate 10-percent reduction in yield of infected stands. Losses may be as high as 25 percent in some seriously infested stands. <u>Armillaria</u> spp. accounted for 80 percent of the root disease damage in conifers; other root pathogens were responsible for the remaining 20 percent. The Southwest loses an estimated 4.8 million cubic feet annually to root rot.
Armillaria root disease <u>Armillaria</u> spp.	Douglas-fir, ponderosa pine, true firs	Arizona, New Mexico	
Schweinitzii butt rot <u>Phaeolus schweinitzii</u>	Douglas-fir, true firs	Arizona, New Mexico	
Tomentosus root rot <u>Inonotus tomentosus</u>	Ponderosa pine, spruce	Arizona, New Mexico	
Black stain root disease <u>Ceratocystis wagneri</u> [<u>Verticicladiella wagneri</u>]	Pinyon pine, ponderosa pine	Arizona, New Mexico	Black stain root disease was scattered throughout the Southwest. Losses were insignificant in commercial timber.

Southwestern Region --Diseases

Southwestern Region—Status of diseases in Arizona and New Mexico—Continued

Disease	Host	Location	Remarks
<u>Ganoderma applanatum</u>	Aspen	Arizona, New Mexico	Scattered throughout the host type, the fungus caused windthrow and standing cull.
FOLIAGE DISEASES			
Elytroderma disease <u>Elytroderma deformans</u>	Pinyon pine, ponderosa pine	Arizona, New Mexico	Elytroderma disease was widely distributed but at low levels.
Marssonina blight <u>Marssonina populi</u>	Aspen	New Mexico	Defoliation of aspen resulting from this blight increased in 1986. The fungus has been positively identified on the Santa Fe and Carson National Forests; together with the large aspen tortrix and the western tent caterpillar, it often caused extensive defoliation.
OTHER			
Abiotic declines	Ponderosa pine	New Mexico	Abiotic declines—possible associated with adverse changes in soil moisture status as a result of road building and other construction activities—have been reported.
Decline	Ponderosa pine	Arizona	An area of declining ponderosa pine has been observed on the Fort Apache Indian Reservation. Although the cause of this decline is unknown, a root disease complex is suspected.

Intermountain Region--Insects

Prepared by Julie Weatherby

Intermountain Region--Status of insects in southern Idaho, Nevada, Utah, and western Wyoming

Insect	Host	Location	Remarks
Douglas-fir beetle <u>Dendroctonus</u> <u>pseudotsugae</u>	Douglas-fir	Idaho, Utah, Wyoming	Activity increased in 1986; 6,237 trees were killed. Group killing of Douglas-fir increased on the Boise, Caribou, and Sawtooth National Forests, ID, and on the Wasatch-Cache National Forest, UT. Mortality decreased on the Bridger-Teton National Forest, WY.
Douglas-fir tussock moth <u>Orygia pseudotsugata</u>	Douglas-fir	Idaho	No new defoliation was observed.
Jeffrey pine beetle <u>Dendroctonus jeffreyi</u>	Jeffrey pine	Nevada	Minimal beetle activity was detected on the Toiyabe National Forest, NV.
Larch casebearer <u>Coleophora laricella</u>	Western larch	Idaho	Some defoliation was observed on the Payette National Forest, ID.
Locust borer <u>Megacyllene robiniae</u>	Black locust	Idaho	Locust borer killed 450 black locust in Boise, ID.
Mountain pine beetle <u>Dendroctonus ponderosae</u>	Lodgepole pine, ponderosa pine, other pines	Idaho, Utah, Wyoming	Mountain pine beetle activity increased in the Region. The outbreak area covered 587,100 acres: 560,400 acres in Utah; 8,000 acres in western Wyoming; and 18,700 acres in Idaho. Mortality increased from 997,481 trees in 1985 to 1,511,635 trees in 1986. Significant infestations occurred on the Boise, Caribou, and Sawtooth National Forests, ID; the Ashley and Wasatch-Cache National Forests, UT; and the Bridger-Teton National Forest, WY. Tree mortality increased to 1.3 million trees on the Ashley National Forest in Utah.
Pine butterfly <u>Neophasia menapia</u>	Ponderosa pine	Idaho	Adult moths were observed in ponderosa pine stands.
Pine engraver <u>Ips pini</u>	Pine	Idaho	A significant increase in activity was observed in southern Idaho; 2,400 trees were killed on the Boise, Payette, Salmon and Sawtooth National Forests.

Intermountain Region--Insects

Intermountain Region—Status of insects in southern Idaho, Nevada, Utah, and western Wyoming—Continued

Insect	Host	Location	Remarks
Pine needle sheathminer <u>Zelleria hainbachi</u>	Lodgepole pine	Idaho	Defoliation by this insect and the sugar pine tortrix was detected on the Targhee National Forest, ID.
Scarab beetle <u>Dichelonyx ?backi?</u>	Lodgepole pine	Idaho	Scattered defoliation on new growth in lodgepole stands was detected on the Targhee National Forest, ID.
Spruce beetle <u>Dendroctonus rufipennis</u>	Engelmann spruce	Idaho, Utah, Wyoming	Epidemic populations continued to cause mortality on the Payette National Forest, ID, where 12,600 trees were infested in 1986. Smaller infestations occurred on the Boise National Forest, ID; on the Bridger-Teton, WY; and on the Uinta, UT.
Spruce bud scale <u>Physokermes piceae</u>	Spruce	Idaho	Infestations were detected on ornamental spruce throughout southern Idaho.
Sugar pine tortrix <u>Choristoneura lambertiana</u>	Pine	Idaho, Wyoming	This insect continued to cause scattered defoliation of lodgepole and ponderosa pines.
Western pine beetle <u>Dendroctonus brevicornis</u>	Ponderosa pine	Idaho	A complex of bark beetles, including the western pine beetle, caused tree mortality on the Boise National Forest, ID.
Western pine shoot borer <u>Eucosma sonomana</u>	Ponderosa pine	Idaho	Scattered infestations were observed.
Western spruce budworm <u>Choristoneura occidentalis</u>	Douglas-fir, spruce, true firs, western larch	Idaho, Utah, Wyoming	About 3.1 million acres were defoliated in 1986 compared to 2.9 million acres in 1985. Defoliation occurred on 2,904,900 acres in Idaho; 95,600 acres in Utah; and 136,500 acres in western Wyoming. Infestations expanded on the Boise, Caribou, Payette, Salmon, and Sawtooth National Forests, ID; and on the Dixie and Wasatch-Cache National Forests, UT. Defoliation decreased, however, on the Challis and Targhee National Forests, ID; on the Fishlake National Forest, UT; and on the Bridger-Teton, WY.

Intermountain Region--Diseases

Prepared by Jim Hoffman

Intermountain Region—Status of diseases in southern Idaho, Nevada, Utah, and western Wyoming

Disease	Host	Location	Remarks															
STEM AND BRANCH DISEASES																		
Aspen trunk rot <u>Phellinus tremulae</u>	Aspen	Idaho, Nevada, Utah, Wyoming	Decay occurred in most aspen stands in the Region.															
Comandra blister rust <u>Cronartium comandrae</u>	Lodgepole pine, ponderosa pine	Idaho, Utah, Wyoming	Infections occurred infrequently on lodgepole pine. Infections on ponderosa pine were found only on some planted stock in southern Idaho.															
Dwarf mistletoes <u>Arceuthobium</u> spp.	Douglas-fir, lodgepole pine, ponderosa pine, western larch	Idaho, Nevada, Utah, Wyoming	These parasites continued to be the most frequently observed pests in the Region. Approximately 3.3 million acres were infested; losses averaged 37.5 million cubic feet per year.															
<table><tr><td></td><td><u>Acres</u></td><td><u>Cubic feet</u></td></tr><tr><td>Southern Idaho</td><td>2,511,000</td><td>28,860,000</td></tr><tr><td>Nevada</td><td>62,000</td><td>580,000</td></tr><tr><td>Utah</td><td>461,000</td><td>4,750,000</td></tr><tr><td>Western Wyoming</td><td>276,000</td><td>3,290,000</td></tr></table>					<u>Acres</u>	<u>Cubic feet</u>	Southern Idaho	2,511,000	28,860,000	Nevada	62,000	580,000	Utah	461,000	4,750,000	Western Wyoming	276,000	3,290,000
	<u>Acres</u>	<u>Cubic feet</u>																
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Utah	461,000	4,750,000																
Western Wyoming	276,000	3,290,000																
Suppression projects removed infected overstory trees from 3,789 acres.																		
Pinyon blister rust <u>Cronartium occidentale</u>	Singleleaf pinyon	Idaho, Nevada	Reported for the first time in the Albion Mountains in Idaho, 6 miles north of the Utah border.															
Red ring rot <u>Phellinus pini</u>	Douglas-fir, pine, spruce, true firs, western larch	Idaho, Utah, Wyoming	This fungus occurred in stands of mature conifers. Infection intensity was varied.															
Rust-red stringy rot <u>Echinodontium tinctorium</u>	Grand fir, subalpine fir, white fir	Idaho, Nevada	Decay caused by this fungus was common in mature and overmature true firs.															
Stalactiform blister rust <u>Cronartium coleosporioides</u>	Lodgepole pine	Idaho, Utah, Wyoming	This rust occurred in localized areas of host type across the Region. Heavy infection occurred in several areas.															

Intermountain Region--Diseases

Intermountain Region—Status of diseases in southern Idaho, Nevada, Utah, and western Wyoming—Continued

Disease	Host	Location	Remarks
Thyronectria canker <u>Thyronectria</u> sp.	Honeylocust	Utah	Utah State University Extension Service found this fungus, for the first time, on honeylocust in Salt Lake City.
Western gall rust <u>Endocronartium</u> <u>barknessii</u>	Lodgepole pine, ponderosa pine	Idaho, Utah, Wyoming	Gall rust occurred throughout host types. Infection levels varied by site.
ROOT DISEASES			
Amnosus root disease <u>Heterobasidion amnosum</u>	Douglas-fir, lodgepole pine, ponderosa pine, true firs	Idaho, Nevada, Utah, Wyoming	This fungus occurred as a root and butt rot of true firs. It can kill young ponderosa pine and predisposes lodgepole pine and Douglas-fir to windthrow and bark beetle attack.
Armillaria root disease <u>Armillaria</u> spp.	Douglas-fir, grand fir, pine, spruce	Idaho, Utah, Wyoming	In southern Idaho, <u>Armillaria</u> spp. was a weak pathogen. In Utah, <u>Armillaria</u> <u>obscura</u> was identified on lodgepole pine, Engelmann spruce, and subalpine fir.
Black stain root disease <u>Ceratocystis wageneri</u> [<u>Verticicladiella</u> <u>wageneri</u>]	Pinyon pine	Idaho, Nevada, Utah	Pinyon pine mortality caused by black stain root disease occurred in progressively expanding disease centers near Almo, ID.
Schweinitzii butt rot <u>Phaeolus schweinitzii</u>	Douglas-fir, ponderosa pine	Idaho	Decay was common in mature and overmature forests, especially those with a recent fire or logging history. The fungus was often found associated with other root diseases and bark beetles.
Tomentosus root rot <u>Inonotus tomentosus</u>	Douglas-fir, lodgepole pine, spruce, subalpine fir	Idaho, Utah	In Idaho, the fungus was commonly found with <u>P. schweinitzii</u> as a root/butt rot of pole-size and larger Douglas-fir and spruce, less often in subalpine fir. Infection can cause tree mortality. In Utah, this disease was detected on Engelmann spruce on the Manti-LaSal National Forest and on lodgepole pine on the Wasatch-Cache National Forest.

Intermountain Region--Diseases

Intermountain Region--Status of diseases in southern Idaho, Nevada, Utah, and western Wyoming--Continued

Disease	Host	Location	Remarks
FOLIAGE DISEASES			
Douglas-fir needle cast <u>Rhabdocline</u> spp.	Douglas-fir	Idaho	Infection, in conjunction with western spruce budworm feeding, continued to cause defoliation and mortality of all size classes of Douglas-fir in central and eastern Idaho.
Elytroderma disease <u>Elytroderma deformans</u>	Ponderosa pine	Idaho	High levels of infection continued throughout the host type, especially in stands around Cascade, ID.
Fir broom rust <u>Melampsorella</u> <u>carvophyllacearum</u>	Subalpine fir	Idaho, Utah, Wyoming	Infection was scattered in subalpine fir. High incidence and infection levels have historically been observed.
Fir needle cast <u>Lirula</u> spp.	Grand fir, subalpine fir	Idaho	Infected stands were found on the Council and Weiser Ranger Districts of the Payette National Forest.
Larch needle cast <u>Meria laricis</u>	Western larch	Idaho	Incidence and severity of infection were at a low level.
Marssonina blight <u>Marssonina populi</u>	Aspen	Idaho, Utah, Wyoming	Scattered incidence of light to moderate intensity was observed throughout the Region.
Spruce broom rust <u>Chrysomyxa</u> <u>arctostaphyli</u>	Engelmann spruce	Idaho, Utah, Wyoming	Infection scattered in the Region. Common in the drainages west of Bear Lake in eastern Idaho.
VASCULAR WILTS			
Dutch elm disease <u>Ceratocystis ulmi</u>	<u>Ulmus</u> spp.	Idaho, Utah	Out of 2,100 elms surveyed along the city streets in Boise, ID, 30 were infected. Mortality of native elms continued in Utah; disease newly confirmed in Logan.
OTHER			
Hail damage	Douglas-fir	Idaho	Hail from an early spring storm stripped the foliage from a 200-acre Douglas-fir stand 15 miles northwest of Cambridge, ID.
Snow damage	Engelmann spruce, lodgepole pine, subalpine fir	Utah, Wyoming	Abnormally wet, heavy snowfall led to avalanches causing uprooting and breakage of spruce and fir in Utah and bending of lodgepole pine terminals in Wyoming.

Pacific Southwest Region--Insects

Prepared by John W. Dale

Pacific Southwest Region—Status of insects in California, Hawaii, Guam, the Commonwealth of the Northern Mariana Islands, the Federated States of Micronesia, and the Republic of Palau

Insect	Host	Location	Remarks
A coconut palm weevil <u>Rhobdoscelus asperipennis</u>	Coconut palm	Palau	Occurs only in the southern parts of the Republic, Peleliu State, and its environs. Extensive trunk boring by larvae can kill the plant.
A longhorned grasshopper <u>Segestes unicolor</u>	Coconut palm, other palms	Palau	Damage common over the Republic.
An armored scale <u>Furcaspis oceanica</u>	Coconut palm, <u>Pandanus</u> sp.	Palau	Heavy infestations result in yellowing and dropping of leaves.
A shorthorned grasshopper <u>Valanga nigricornis</u>	Banana, citrus	Palau	Common. Amount of defoliation is variable.
A shortnosed weevil <u>Lophothetas</u> sp.	Banana, mango; many forest and ornamental trees	Palau	Common.
A sulfur butterfly <u>Eurema hecabe</u>	Albizia	Northern Mariana Islands	Moderate defoliation continued in mixed forest as well as in the Saipan biomass plantation.
A tip borer	Mahogany	Federated States of Micronesia	Seedlings damaged in nurseries on Pohnpei.
A western spruce budworm <u>Choristoneura caruana californica</u>	Douglas-fir	Northern California	Larval sampling in May and egg mass sampling in August confirmed the end of the current infestation (1982-85). A combination of climatic conditions and application of <u>Bacillus thuringiensis</u> in 1985 caused the population decline.
Black citrus swallowtail <u>Papilio polytes</u>	Citrus	Palau	Complete defoliation occurred on some small plants.
Chinese rose beetle <u>Adoretus sinicus</u>	Banana, Polynesian chestnut, tropical almond	Northern Mariana Islands	Common. Defoliation occurred on small and young plants in Palau. The beetle caused defoliation of chestnut on Saipan in the Marpi Commonwealth Forest.
Citrus flower moth <u>Prays citri</u>	Citrus	Palau	The immature stages feed on flowers and cause galls in the fruit rind.

Pacific Southwest Region--Insects

Pacific Southwest Region—Status of insects in California, Hawaii, Guam, the Commonwealth of the Northern Mariana Islands, the Federated States of Micronesia, and the Republic of Palau—Continued

Insect	Host	Location	Remarks
Citrus leafminer <u>Phyllocnistis citrella</u>	Citrus	Palau	Heavy infestation results in deformed leaves, which drop prematurely.
Coconut leaf beetle <u>Brontispa</u> <u>chalybeipennis</u>	Coconut palm	Hawaii	This beetle was first discovered in October 1985. An eulophid parasite from Taiwan was released in September 1986 for natural control.
Coconut rhinoceros beetle <u>Oryctes rhinoceros</u>	Coconut palm	Palau	Common in all the archipelago, except the Southwest Island.
Coconut scale <u>Aspidiotus destructor</u>	Avocado, coconut palm, and others	Guam, Palau	Common in Palau. Damage is spotty in the absence of biological control agents, one of which is effective when present.
Douglas-fir tussock moth <u>Oryia pseudotsugata</u>	Douglas-fir	Central and northern California	Pheromone trap catches declined somewhat relative to 1985. In 1986, 23 plots (21 percent of 107 plots) had more than 25 adults per trap. Trap catches and cocoon-egg mass surveys indicated that the populations, which began to increase in 1983-84, have either leveled out or are beginning to decline. Large catches (more than 40 moths/trap) occurred only in a few locations on the Eldorado and Stanislaus National Forests. There was no aerially visible defoliation in 1986.
Eucalyptus borer <u>Phoracantha</u> <u>semipunctata</u>	<u>Eucalyptus</u> spp.	Southern California	First discovered in 1984, this cerambycid woodborer is now found in all six southern California counties. Although a strong flier, spread is primarily through the movement of firewood. Eucalyptus vary in their susceptibility by species and degree of moisture stress.
Fir engraver <u>Scolytus ventralis</u>	Firs	California	White fir mortality caused by attacks in 1985 was abundant in the Camp Richardson Estates area of Lake Tahoe, El Dorado County. Several group kills of white fir were also evident in Yosemite National Park, Mariposa County.

Pacific Southwest Region--Insects

Pacific Southwest Region--Status of insects in California, Hawaii, Guam, the Commonwealth of the Northern Mariana Islands, the Federated States of Micronesia, and the Republic of Palau--Continued

Insect	Host	Location	Remarks
Fruit-piercing moth <u>Eudocima fullonia</u>	Citrus, guava	Northern Mariana Islands	Severe damage to fruit of citrus and guava as well as some damage to banana, mango, starfruit, soursop, eggplant, and tomato.
Fruittree leafroller <u>Archips argyrospila</u>	California black oak, other hardwoods	Southern California	Damage in the vicinity of Lake Gregory-Lake Arrowhead dropped to the lowest level in recent years.
Gypsy moth <u>Lymantria dispar</u>	Hardwoods, ornamentals	California	Only 20 moths were caught in 27,000 traps and only one property had eggs or pupal cases. No sites were treated for eradication.
Hibiscus mealybug <u>Nipaecoccus vastator</u>	<u>Leucaena</u> sp.	Northern Mariana Islands	Populations are below economic level on Saipan, Tinian, and Rota as a result of the introduction during 1980-84 of a hymenopterous parasite from Hawaii.
Jeffrey pine beetle <u>Dendroctonus jeffreyi</u>	Jeffrey pine	California	Tree mortality in the Fallen Leaf-Kiva-Estates suppression project area near South Lake Tahoe declined from 330 trees in 1982-83 to 14 trees in 1986. Scattered mortality continued in other areas in the Tahoe Basin.
Jeffrey pine needleminer <u>Coleotechnites</u> sp.	Jeffrey pine	California	No defoliation of consequence was observed in formerly active areas in San Bernardino County, and the 25,000-acre outbreak near Portola, Plumas County, collapsed.
Lodgepole needleminer <u>Coleotechnites milleri</u>	Lodgepole pine	Yosemite National Park	Larval surveys confirmed that populations in the Park are at their lowest levels in over two decades.
Melon fly <u>Dacus cucurbitae</u>	Avocado, citrus, figs, mango	Northern Mariana Islands	Population continued to slowly increase on Rota. A new infestation was discovered on Tinian and Saipan in July.
Modoc budworm <u>Choristoneura retiniana</u>	White fir	Northeastern California	Moderate defoliation occurred on 50,000 acres in the Warner Mountains and the Manzanita Mountain area of Modoc County. Level of defoliation was greatly reduced when compared to that of the past 3 years.

Pacific Southwest Region--Insects

Pacific Southwest Region—Status of insects in California, Hawaii, Guam, the Commonwealth of the Northern Mariana Islands, the Federated States of Micronesia, and the Republic of Palau—Continued

Insect	Host	Location	Remarks
Mountain pine beetle <u>Dendroctonus</u> <u>ponderosae</u>	Lodgepole pine, ponderosa pine, sugar pine	Central and northern California	Mortality occurred over 15,000 to 20,000 acres in Yosemite National Park in stands previously defoliated by the lodgepole needleminer. Elsewhere, damage was light and scattered; but for some residential lot owners, even scattered tree mortality was unacceptable.
Nantucket pine tip moth <u>Rhyacionia frustrana</u>	Monterey pine	Santa Cruz and Alameda Counties	This moth has been detected for the first time in northern California. A total of five moths were trapped in two different commercial nurseries near Sunol, Alameda County. Several live and dead pupae, as well as pupal skins, were discovered during a survey of hosts in and around the nurseries.
New Guinea sugarcane weevil <u>Rhodoscelus obscurus</u>	Betel nut palm, coconut palm	Palau	Like the coconut palm weevil, larvae tunnel in the trunk.
Orange spiny whitefly <u>Aleurocanthus</u> <u>spiniferus</u>	Citrus, mango, plumeria	Federated States of Micronesia	Common on Kosrae. A heavy, black, sooty mold is often associated with severe infestations.
Palau coconut beetle <u>Brontispa palauensis</u>	Coconut palm	Palau	Beetles feed within the unopened leaves, and leaflets turn brown upon opening.
Pine engravers <u>Ips</u> spp.	Pines	California	Top-killing and tree mortality caused by pine engravers were heavy enough in a few localities to concern resource managers. Situations involved residual trees in logging sites and old burns, and stress caused by a rise in the water table. An increase in top-killing of dominant pines was noted on the Nevada City Ranger District of the Tahoe National Forest, Nevada County, and the Placerville Ranger District, Eldorado National Forest, El Dorado County. Pine engravers also killed 10 to 20 percent of the 25-year-old ponderosa pine in a 100-acre plantation on the Nevada City Ranger District.

Pacific Southwest Region--Insects

Pacific Southwest Region—Status of insects in California, Hawaii, Guam, the Commonwealth of the Northern Mariana Islands, the Federated States of Micronesia, and the Republic of Palau—Continued

Insect	Host	Location	Remarks
Poinciana looper <u>Pericyma cruegeri</u>	Flame tree	Guam, Northern Mariana Islands, Palau	Recently introduced into Palau; defoliation was common on Koror. On Guam and Rota, Northern Mariana Islands, the looper continued to severely affect some host trees.
Redbanded thrips <u>Selenothrips rubrocinctus</u>	Avocado, cashew, cocoa, mango	Northern Mariana Islands, Palau	Leaf scarification common to all host on Palau; becomes damaging on young plants.
Spiraling whitefly <u>Aleurodicus dispersus</u>	Fruit trees, ornamentals, shade trees	Federated States of Micronesia, Northern Mariana Islands, Palau	A recent introduction to Palau that has become a serious pest on host plants on Koror. Widespread in the agroforests and villages of Pohnpei, Federated States of Micronesia. Infestations remained moderate to heavy on Saipan and Rota, Northern Mariana Islands.
Tangantangan psyllid <u>Heteropsylla incisa</u>	<u>Leucaena</u> <u>leucocephala</u> , <u>Leucaena</u> spp., <u>Samanea saman</u>	Hawaii, Northern Mariana Islands, Palau	Discovered in Hawaii in 1984, the population fluctuates with flushes of foliage and is controlled by coccinellids. The insect was nearly eradicated in the Marianas by the supertyphoon Kim but is expected to recover in 1987. Newly introduced into Palau, it has completely defoliated many leucaena on Koror.
Tent caterpillar <u>Malacosoma</u> sp.	Bitterbrush	Northern and eastern California	Areas of heavy defoliation increased to 18,000 acres in Inyo and Mono Counties. Larval rearings indicated that a virus is appearing in some caterpillar populations.
Western pine beetle <u>Dendroctonus brevicomis</u>	Coulter pine, ponderosa pine	California	Activity was at a very low level in 1986.
Western yellowjacket <u>Vespula pensylvanica</u>	Other insects, small forest animals, man	Hawaii	A localized public health concern.
White fir needleminer <u>Epinotia meritana</u>	White fir	Northeastern California	Damage occurred in conjunction with that of the Modoc budworm and was very light.

Pacific Southwest Region--Diseases

Prepared by Gregg A. DeNitto

Pacific Southwest Region—Status of diseases in California, Hawaii, Guam, the Commonwealth of the Northern Mariana Islands, the Federated Republic of Micronesia, and the Republic of Palau

Disease	Host	Location	Remarks
STEM AND BRANCH DISEASES			
Bacterial canker <u>Xanthomonas</u> sp.	Citrus	Guam, Northern Mariana Islands	Common on citrus trees on Guam. Stems and twigs of citrus in the wild were affected. Similar blotches on leaves and stems were also found on forest trees and may be of the same pathogenic origin.
Botryosphaeria canker <u>Botryosphaeria</u> <u>rubis</u>	Hoaryleaf ceanothus	Southern California	Involved in a dieback of this important brush species in southern California. Dieback may have increased fire hazard and erosion potential.
Dwarf mistletoes <u>Arceuthobium</u> spp.	Douglas-fir, pine, true firs	California	Infected conifers on 2.2 million acres of commercial forest land in California. In addition to causing growth loss, dwarf mistletoes have been associated with the mortality of some 312,500 trees annually. Suppression projects were carried out in pine stands on the Sequoia and Plumas National Forests and in recreation areas on the Lake Tahoe Basin Management Unit, on Kings Canyon National Park, and on the Angeles National Forest.
Oak twig dieback <u>Cryptocline</u> <u>cinerascens</u>	Oak	Central and northern California	Twig dieback of live and white oaks caused concern in residential and recreation areas. The range of the disease extended north to the Trinity River.
Pitch canker <u>Fusarium moniliforme</u> var. <u>subglutinans</u>	Aleppo pine, bishop pine, Monterey pine	Central coastal California	This canker was reported for the first time from Monterey, Santa Cruz, Alameda, San Mateo, and Santa Clara Counties. One isolate was very pathogenic to Monterey pine. At present, impact is limited, but the disease could threaten Christmas tree plantations, recreation areas, and urban areas.
True mistletoes <u>Phoradendron</u> spp. <u>Viscum album</u>	Cottonwoods, oaks, sycamores, other native and introduced hardwoods	California	Infection was common in many native hardwood stands in California. These parasitic plants have caused a decline of vegetation in many high-use recreation areas.

Pacific Southwest Region--Diseases

Pacific Southwest Region—Status of diseases in California, Hawaii, Guam, the Commonwealth of the Northern Mariana Islands, the Federated Republic of Micronesia, and the Republic of Palau—Continued

Disease	Host	Location	Remarks
White fir mistletoe <u>Phoradendron bolleanum</u>	White fir	Central and southern California	Infestations were severe in some stands in the southern Sierra Nevada and in southern California. Mistletoe was involved in 15 to 20 percent of the white fir mortality on the San Bernardino National Forest.
White pine blister rust <u>Cronartium ribicola</u>	Sugar pine, western white pine	Central and northern California	Reports of new infections came in from many areas of northern and central California. Surveys of plantations on National Forests found high levels of infection. Infection levels ranged from 61 to 72 percent of the trees, with mortality projected at 56 to 79 percent.
ROOT DISEASES			
Amnosus root disease <u>Heterobasidion amnosum</u>	Conifers	California	One of the principal root diseases of pines and true firs in California, amnosus root disease has destroyed some 19 million cubic feet of timber annually. In recreation forests, it has been associated with tree failures, property damage, and injury to forest visitors. Suppression efforts were continued to reduce the impacts of the disease in Yosemite National Park. On the Modoc National Forest, surveys of 10- to 15-year-old timber sales where borax was not used revealed about 20 percent of the acreage out of production.
Armillaria root disease <u>Armillaria</u> sp.	Valley oak	Yosemite National Park	An oak in Yosemite National Park failed because it lost its structural roots. Some property damage reported.
Black stain root disease <u>Ceratocystis wagneri</u> [<u>Verticicladiella wagneri</u>]	Douglas-fir, ponderosa pine, singleleaf pinyon pine	California	New reports of this disease on ponderosa pines on the Stanislaus National Forest. Infections continued to be found in Douglas-fir plantations and natural stands in northern California.

Pacific Southwest Region--Diseases

Pacific Southwest Region—Status of diseases in California, Hawaii, Guam, the Commonwealth of the Northern Mariana Islands, the Federated Republic of Micronesia, and the Republic of Palau—Continued

Disease	Host	Location	Remarks
Flame tree root disease <u>Phellinus noxius</u>	Flame tree	Guam, Northern Marianas Islands	Caused some site-specific mortality on Rota, but was less host-specific and more scattered on Saipan. Also noted on other leguminous species in gardens and forest.
Laminated root rot <u>Phellinus weirii</u>	Douglas-fir	Northern California	Known range confined to a few sites in Humboldt County.
Port-Orford-cedar root disease <u>Phytophthora lateralis</u>	Port-Orford-cedar	Northern California	The disease was confined to the Smith River watershed, Six Rivers National Forest.
FOLIAGE DISEASES			
Dothistroma needle blight <u>Mycosphaerella pini</u> [<u>Dothistroma septospora</u> (= <u>Dothistroma pini</u>)]	Jeffrey pine, ponderosa pine	Kings Canyon National Park	Limited infections found on trees at Cedar Grove in the Park.
Elytroderma disease <u>Elytroderma deformans</u>	Jeffrey pine, ponderosa pine	California	Widespread, but no increase in severity.
Incense-cedar rust <u>Gymnosporangium libocedri</u>	Incense-cedar	Northern California	Incense-cedars in the Mt. Shasta area were reported to be heavily infected.
VASCULAR WILTS			
Dutch elm disease <u>Ceratocystis ulmi</u>	Elm	San Francisco Bay Area	Incidence decreased and the disease remained confined to the Bay area. However, the disease has spread within the area: Infection was confirmed and treated on 270 trees.
NURSERY DISEASES			
Fusarium root rot <u>Fusarium oxysporum</u>	Douglas-fir, sugar pine	Northern California	Some losses of 1-1 Douglas-fir at Humboldt Nursery; hypocotyl rot of 1-0 sugar pine at Placerville Nursery.
Phoma blight <u>Phoma euphyrenae</u>	Douglas-fir, white fir	Northern California	Humboldt Nursery sustained some losses of Douglas-fir from stem cankers and a tip blight of white fir.
Sirococcus tip blight <u>Sirococcus strobilinus</u>	Afghanistan pine, Jeffrey pine	Northern California	Losses of 2-0 Jeffrey pine at Humboldt Nursery. Reported on Afghanistan pine at Placerville Nursery.

Pacific Southwest Region--Diseases

Pacific Southwest Region—Status of diseases in California, Hawaii, Guam, the Commonwealth of the Northern Mariana Islands, the Federated Republic of Micronesia, and the Republic of Palau—Continued

Disease	Host	Location	Remarks
OTHER			
Air pollution effects			
Ozone	Jeffrey pine, ponderosa pine	Central and southern California	Ozone injury was present from southern California north to the Tahoe National Forest. Levels of injury in the Sierra Nevada generally declined in severity from south to north. Since last evaluated in 1984, ozone injury plots on the Sequoia National Forest showed small increases at 4,000 to 5,000 feet and small decreases at 7,000 to 8,000 feet. Plots at 6,000 feet showed no clear trend.
Cadang-cadang Yellow mottle viral decline	Coconut palm	Guam	Potentially serious to coconut palm, which is the predominant vegetation and essential to the islanders' daily lives.
Phytophthora dieback <u>Phytophthora</u> <u>palmivora</u>	<u>Elaeocarpus</u> <u>joga</u> , <u>ifil</u> (<u>Intsia</u> <u>bijuga</u>)	Guam	Caused bud rot, leaf drop, and wilt in coconut and other palms. Infestation was static.

Pacific Northwest Region--Insects

Prepared by David R. Bridgwater

Pacific Northwest Region--Status of insects in Oregon and Washington

Insect	Host	Location	Remarks
Douglas-fir beetle <u>Dendroctonus</u> <u>pseudotsugae</u>	Douglas-fir	Oregon, Washington	<p>Douglas-fir beetle damage decreased east of the Cascade Range: Losses in Douglas-fir occurred on 3,700 acres (245,730 cubic feet). Current damage levels are still far below what they were in the 1970's. The greatest damage in 1986 was on the Wallowa-Whitman National Forest in Oregon.</p> <p>West of the Cascades, losses decreased significantly. Damage was reported on 3,670 acres in 1986 compared to 17,720 acres in 1985; volume loss fell from 1.2 million cubic feet in 1985 to 0.8 million cubic feet in 1986.</p>
Douglas-fir bud moth <u>Zeiraphera hesperiana</u>	Douglas-fir	Oregon	<p>Light to heavy defoliation was reported on 122,650 acres of mature Douglas-fir. Most of the defoliation was on the Siuslaw National Forest and adjoining State, private, and Bureau of Land Management lands. Smaller areas of defoliation occurred on the Willamette National Forest. This is the second year of defoliation caused by this insect since the mid-1960's.</p>
Fir engraver <u>Scolytus ventralis</u>	True firs	Oregon, Washington	<p>A substantial increase in fir engraver activity was noted in Washington but the level of activity remained the same in Oregon. Most of the fir engraver damage occurred on sites infected with either laminated root rot, armillaria root disease, or annosus root disease--diseases which weaken true firs, making them susceptible to beetle attacks. Total losses occurred on 15,920 acres (315,200 cubic feet) as compared to 11,470 acres (198,020 cubic feet) in 1985.</p>

Pacific Northwest Region--Insects

Pacific Northwest Region--Status of insects in Oregon and Washington--Continued

Insect	Host	Location	Remarks
Gypsy moth <u>Lymantria dispar</u>	Conifers, various hard- woods	Oregon, Washington	<p>In Washington, trap catches decreased from 175 adults in 1985 to 56 adults in 1986. An eradication project continued in Bellingham, WA; and a new one using the inherited sterility technique began in Manor, WA.</p> <p>In Oregon, trap catches fell from 1,537 adults in 1985 to 246 in 1986. An eradication project using E.T. was conducted on 194,000 acres in Lane County. A 12,000-acre project is planned for 1987.</p>
Modoc budworm <u>Choristoneura</u> <u>retiniana</u>	Douglas-fir, true firs	Southern Oregon	<p>Modoc budworm defoliation decreased in southern Oregon in true fir stands on the Fremont and Winema National Forests. Visible defoliation decreased from 503,400 acres in 1985 to 281,910 acres in 1986.</p>
Mountain pine beetle <u>Dendroctonus</u> <u>ponderosae</u>	Lodgepole pine, ponderosa pine, western white pine, other pines	Oregon, Washington	<p>In Washington, losses increased. In Oregon, losses have intensified on the Deschutes, Fremont, and Winema National Forests; however, losses continued to decline on the Wallowa-Whitman, Malheur, and Umatilla National Forests, primarily because the most suitable host trees have already been killed.</p> <p>Approximately 1.76 million acres were infested during 1986: Oregon had 1,600,000 acres infested; Washington had 157,000 acres. In 1985, 1.5 million acres were infested.</p> <p>Losses occurred on 1.42 million acres of lodgepole pine (59 million cubic feet); 288,000 acres of ponderosa pine (5.6 million cubic feet); 49,000 acres of western white pine (2.6 million cubic feet); and about 1,600 acres of various other pines (34,000 cubic feet).</p> <p>Intense losses are expected to continue in south-central Oregon and north-central Washington and to decrease elsewhere.</p>

Pacific Northwest Region--Insects

Pacific Northwest Region--Status of insects in Oregon and Washington--Continued

Insect	Host	Location	Remarks
Pine engraver <u>Ips</u> sp.	Ponderosa pine	Oregon, Washington	Pine engraver activity increased to 10,040 acres. Most of the activity was on the Deschutes and Ochoco National Forests in Oregon and the Wenatchee and Okanogan National Forests in Washington.
Spruce beetle <u>Dendroctonus</u> <u>rufipennis</u>	Engelmann spruce	Oregon, Washington	Losses occurred on 24,500 acres (1.8 million cubic feet). Spruce beetle activity in Engelmann spruce stands in Oregon increased: A major outbreak developed on the Wallowa-Whitman National Forest near Halfway, OR. However, losses in Washington were very low in 1986.
Sugar pine tortrix <u>Choristoneura</u> <u>lambertiana</u>	Lodgepole pine, ponderosa pine	Oregon	For the first time in many years, defoliation was observed from the ground in 1985. In 1986, defoliation was visible from the air over 136,560 acres. The defoliation occurred on the Deschutes, Fremont, and Winema National Forests.
Western pine beetle <u>Dendroctonus</u> <u>brevicomis</u>	Ponderosa pine	Oregon, Washington	Mortality caused by the beetle decreased in Oregon and Washington from 4.9 million cubic feet in 1985 to 2.6 million cubic feet in 1986. Greatest losses occurred on the Winema and Deschutes National Forests.
Western spruce budworm <u>Choristoneura</u> <u>occidentalis</u>	Douglas-fir Engelmann spruce, true firs, western larch	Oregon, Washington	<p>Visible defoliation increased from 5.0 million acres in 1985 to 6.0 million acres in 1986: Oregon had 5.6 million acres defoliated; Washington had 0.4 million acres defoliated.</p> <p>In Oregon, populations continued to increase on the Wallowa-Whitman, Mt. Hood, Deschutes, and Umatilla National Forests; the Warm Springs Indian Reservation; and intermingled State and private lands.</p> <p>In Washington, the size of the infestation increased on the Okanogan National Forest and adjacent State and private lands but decreased on the Wenatchee National Forest.</p>

Pacific Northwest Region--Diseases

Prepared by Donald J. Goheen

Pacific Northwest Region--Status of diseases in Oregon and Washington

Disease	Host	Location	Remarks
STEM AND BRANCH DISEASES			
Dwarf mistletoes <u>Arceuthobium</u> spp.	Various conifers	Oregon, Washington	As stand management intensifies, losses due to this group of disease-causing plants are declining. However, dwarf mistletoes still caused an estimated loss of 132 million cubic feet of timber in Oregon and Washington in 1986. Programs for handheld programmable calculators are being used to project reductions in yield and perform economic analyses for dwarf mistletoe-infected lodgepole pine in central Oregon.
Stem decay	Various conifers	Oregon, Washington	Stem decay fungi consumed enormous volumes of wood. Most losses occurred in younger stands of thin-bark species, which are susceptible to wounding during stand entries. Wounding of residual trees both activates dormant infections and creates areas where new infections can begin. Programs for handheld calculators have been developed to estimate percentages of infection and decay in white and grand fir understories, two of the most decay-damaged species in the Region.
White pine blister rust <u>Cronartium ribicola</u>	Sugar pine, western white pine	Oregon, Washington	Annual losses of western white and sugar pines from blister rust in Oregon and Washington were estimated to be 15 million cubic feet. Additional training and followup on use of handheld programmable calculator programs for predicting infection hazard occurred during 1986.
ROOT DISEASES	Various conifers	Oregon, Washington	Root diseases were among the most serious pest problems in Oregon and Washington forests. The incidence of root disease is increasing, often in direct response to human activity. Annual losses to root diseases on all ownerships were estimated at over 130 million cubic feet.

Pacific Northwest Region--Diseases

Pacific Northwest Region--Status of diseases in Oregon and Washington--Continued

Disease	Host	Location	Remarks
<p>Annosus root disease <u>Heterobasidion</u> <u>annosum</u></p>	Western hemlock, white fir	Oregon, Washington	Annosus root disease was responsible for extensive losses in many partially cut white fir stands in southern and eastern Oregon. Most losses were due to outright tree mortality. Evidence pointed to extensive infection throughout eastern Oregon and Washington. Losses in western hemlock stands can be minimized by short (100-year) rotations and wound prevention.
<p>Armillaria root disease <u>Armillaria</u> spp.</p>	Various conifers	Oregon, Washington	The most serious losses to this disease occurred east of the Cascades. Losses west of the Cascades were usually confined to stressed stands, such as off-site plantings. Direct control through stump and root removal is being practiced in severely infected stands in eastern Washington.
<p>Black stain root disease <u>Ceratocystis wageneri</u> <u>[Verticicladiella</u> <u>wageneri]</u></p>	Douglas-fir	Oregon, Washington	In southwestern Oregon, this was by far the most commonly encountered disease in Douglas-fir plantations. It appeared to be especially damaging where disturbances have occurred, especially in roadside Douglas-firs cut back by mechanical choppers. Losses were also greater on tractor-logged sites, which have greater soil compaction, than on cable-logged sites.
<p>Laminated root rot <u>Phellinus weirii</u></p>	Douglas-fir, grand fir, white fir	Oregon, Washington	Laminated root rot is estimated to have removed about 5 percent of the Douglas-fir type west of the Cascades from full production. The total acreage infested may be closer to 10 percent of the Douglas-fir. Damage was also severe in some East Side grand and white fir stands.
<p>Port-Orford-cedar root disease <u>Phytophthora lateralis</u></p>	Port-Orford-cedar	Southwestern Oregon	Port-Orford-cedar root disease continued to cause widespread mortality of Port-Orford-cedar in southwestern Oregon.

Pacific Northwest Region -- Diseases

Pacific Northwest Region--Status of diseases in Oregon and Washington--Continued

Disease	Host	Location	Remarks
FOLIAGE DISEASES			
Dothistroma needle blight <u>Mycosphaerella pini</u> <u>[Dothistroma septospora</u> (=Dothistroma pini)]	Douglas-fir, lodgepole pine, ponderosa pine	Oregon, Washington	Because of dry weather in spring and early summer, the incidence of several foliage diseases was low relative to incidence in past years.
Douglas-fir needle cast <u>Rhabdocline pseudotsugae</u>			
Elytroderma disease <u>Elytroderma deformans</u>			
NURSERY DISEASES			
Douglas-fir canker diseases <u>Botrytis cinerea</u> <u>Fusarium roseum</u> <u>Phoma euphratica</u> <u>Phomopsis</u> spp.	Douglas-fir	Oregon, Washington	Damage was scattered, with less than 1 percent of crop affected in most nurseries. Fungicide applications were helpful when cankers were above ground and not covered with soil collars.
Fusarium root and hypocotyl rots <u>Fusarium oxysporum</u>	Various conifers	Oregon, Washington	Scattered losses for most species; continued heavy mortality in sugar pine.
Larch needle cast <u>Meria laricis</u>	Western larch	Washington	Dry weather and fungicide treatments resulted in little infection or defoliation during 1986.
Phytophthora root rot <u>Phytophthora</u> spp.	Douglas-fir, other conifers	Oregon, Washington	Damage was confined primarily to low, poorly drained areas of nursery beds.

Southern Region--Insects

Prepared by Patrick J. Barry

Southern Region--Status of insects in Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia; and Puerto Rico and the U.S. Virgin Islands

Insect	Host	Location	Remarks
Ragworm <u>Thyridopteryx</u> <u>epheneraeformis</u>	Eastern redcedar, eastern white pine, loblolly pine, Virginia pine	Georgia, North Carolina, South Carolina, Tennessee, Virginia	High population levels and widespread defoliation in localized areas.
Balsam woolly adelgid <u>Adelges piceae</u>	Fraser fir	North Carolina, Tennessee, Virginia	Populations are at low levels in North Carolina and Tennessee. A survey of the Mount Rogers National Recreation Area found 11 infested areas, which covered a total of 23 acres. Infestations were located between Cabin Ridge and Wilburn Ridge. Only one area (1 acre in size) had mortality, which may have been caused by the combination of the adelgid and water stress from the recent drought.
Black turpentine beetle <u>Dendroctonus terebrans</u>	Southern pines	Regionwide	Drought stress and late spring wildfires predisposed many forest stands to moderate losses. Drought stress and previous stress from a severe scale infestation resulted in heavy attacks on shortleaf pines in the Beech Creek Seed Orchard in North Carolina.
Cane worms <u>Dioryctria amatella</u> <u>Dioryctria clarioralis</u> <u>Dioryctria disclusa</u> <u>Dioryctria merkeli</u>	Loblolly pine	Regionwide	In pine seed orchards, pheromone trap catches indicated that populations of <u>D. disclusa</u> and <u>D. merkeli</u> decreased somewhat across the South. Certain treated orchards and seed sources continued to sustain significant losses caused by <u>D. merkeli</u> . <u>D. clarioralis</u> populations have increased throughout the South, while <u>D. amatella</u> populations have increased dramatically in some areas but decreased in others. <u>D. amatella</u> and <u>D. clarioralis</u> continued to cause low to moderate damage across the South.
Eastern tent caterpillar <u>Malacosoma americanum</u>	Black cherry, other Rosaceae	Georgia, Kentucky, North Carolina, South Carolina, Tennessee, Virginia	High population levels and widespread defoliation throughout each State.

Southern Region--Insects

Southern Region—Status of insects in Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia; and Puerto Rico and the U.S. Virgin Islands—Continued

Insect	Host	Location	Remarks
Fall webworm <u>Hyphantria cunea</u>	Various hardwoods	Georgia, Kentucky, North Carolina, South Carolina, Tennessee, Virginia	Populations continued at high levels. Widespread defoliation reported in late summer.
Forest tent caterpillar <u>Malacosoma disstria</u>	Tupelo gum, other hardwoods	Alabama, Louisiana, North Carolina, South Carolina	Localized light defoliation occurred in Alabama. Partial to complete defoliation occurred on 727,000 acres in south Louisiana. This has resulted in a growth loss of 290,000 cords of wood valued at \$1,400,000. North Carolina and South Carolina experienced moderate to heavy defoliation in localized areas of the Coastal Plain.
Fruittree leafroller <u>Archips arcyrospila</u>	Baldcypress	Louisiana	Noticeable defoliation (entire crown turns red) was restricted to 15,000 acres in Atchafalaya Basin. Light defoliation on an additional 20,000 acres. This resulted in a growth loss of 450,000 board feet valued at \$36,000.
Grasshoppers <u>Melanoplus</u> sp.	Dogwood, hickory, red oak	Tennessee	Heavily defoliated 1 to 2 acres in Cumberland County.
Gypsy moth <u>Lymantria dispar</u>	Various hardwoods	Arkansas, North Carolina, Texas, Virginia	The northern half of Virginia was generally infested. The quarantine line has been extended south to include the northern portion of Augusta County, south and east to the City of Richmond, and south to the tidewater area. Defoliation this year occurred on 27,300 acres. Isolated infestations were located in North Carolina and Virginia. Male moths were trapped in Arkansas and Texas; however, all were single catches.
Hickory bark beetle <u>Scolytus quadrispinosus</u>	Hickory	Tennessee	Combined with hickory decline, the hickory bark beetle has caused scattered tree mortality in middle and east Tennessee.

Southern Region--Insects

Southern Region—Status of insects in Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia; and Puerto Rico and the U.S. Virgin Islands—Continued

Insect	Host	Location	Remarks
Introduced pine sawfly <u>Diprion similis</u>	Eastern white pine	North Carolina, Tennessee, Virginia	Populations continued at low levels in all three States.
Larch sawfly <u>Pristiphora erichsonii</u>	Larch	North Carolina	A new population was found on larch at the Cradle of Forestry, Transylvania County. Heavy defoliation occurred on half the trees.
Loblolly pine sawfly <u>Neodiprion taedae linearis</u>	Loblolly pine	Mississippi, Tennessee, Virginia	Scattered defoliation occurred in DeSoto County, MS. Moderate defoliation was reported in the western middle part of Tennessee. Light defoliation occurred in localized areas of Virginia.
Locust leafminer <u>Odontota dorsalis</u>	Black locust	Kentucky, North Carolina, Tennessee, Virginia	Scattered moderate to heavy defoliation throughout Kentucky, North Carolina, Tennessee, and Virginia.
Looper complex Linden looper <u>Erannis tiliaria</u> Eastern oak looper <u>Phigalia titea</u> Fall cankerworm <u>Alsophila pometaria</u>	Oaks	Virginia	Populations were at very low levels in 1986, with only small, localized areas of light defoliation.
<u>Lygus</u> spp.	Loblolly pine, slash pine	Nurseries regionwide	Forked ("bushy-topped") 1-0 nursery stock resulted from feeding of <u>Lygus</u> spp. and/or other insect pests, including thrips. Damage in and among nurseries was sporadic in intensity. Causal agents not fully determined.
Maple petiole borer <u>Caulocampus acericaulis</u>	Sugar maple	Tennessee	In Davidson County, sugar maple prematurely "defoliated" in many locations after the wind severed the bored-out leaf petioles.
Nantucket pine tip moth <u>Rhyacionia frustrana</u>	Loblolly pine, shortleaf pine, Virginia pine	Regionwide	Moderate populations occurred throughout Region. Some severe damage was observed in Christmas tree plantations in Georgia, South Carolina, North Carolina, Tennessee, and Virginia.

Southern Region--Insects

Southern Region—Status of insects in Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia; and Puerto Rico and the U.S. Virgin Islands—Continued

Insect	Host	Location	Remarks
Periodical cicada <u>Magicicada septendecim</u>	Various hardwoods	North Carolina, Tennessee	Caused severe flagging of various hardwood trees.
Pine engravers <u>Ips</u> spp.	Southern pines	Regionwide	Activity was reported in seed orchards in North Carolina and Georgia and caused some tree mortality. Mortality was high throughout the Southeast in drought-stressed areas. High levels of mortality also occurred in late spring, where trees were severely stressed by wildfire.
Pine leaf adelgid <u>Pineus pinifoliae</u>	Eastern white pine, red spruce	North Carolina, Tennessee	Galls, evident on spruce in May and June, caused flagging of white pine terminal branch endings later in the summer. Damage to white pine was heavy in localized areas where alternate host, spruce, was present.
Redheaded pine sawfly <u>Neodiprion lecontei</u>	Loblolly pine	Mississippi, Texas	Ten acres of 4-year-old loblolly pine were infested in Smith County, TX. Scattered incidences were reported in southwest Mississippi.
Reproduction weevils Pales weevil <u>Hylobius pales</u> Pitch-eating weevil <u>Pachylobius picivorus</u>	Southern pines	Florida, North Carolina	Losses reported in some regeneration areas in Florida and in Davidson County, NC.
Scales <u>Toumeyella</u> spp.	Southern pines	Regionwide	The sporadic outbreaks of tortoise scales declined, but these species continued to cause damage in shortleaf pine orchards. In North Carolina, many of these trees were subsequently infested with <u>Ips</u> .
<u>Pseudophilippia</u> <u>quaintancii</u>	Southern pines	Regionwide	Scattered light populations were reported in Alabama, South Carolina, Virginia, and Georgia.
Seedbugs <u>Leptoglossus corculus</u> <u>Tetyra binunctata</u>	Southern pines	Florida, North Carolina, South Carolina	Moderate populations caused scattered seed losses.
Slash pine thrips <u>Gnophothrips fuscus</u>	Slash pine	Florida	Minimal seed and cone losses reported.

Southern Region--Insects

Southern Region—Status of insects in Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia; and Puerto Rico and the U.S. Virgin Islands—Continued

Insect	Host	Location	Remarks
Southern pine beetle <u>Dendroctonus frontalis</u>	Southern pines	Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Texas, Virginia	The southern pine beetle outbreak expanded during 1986, and the beetle was active in 11 States. The record outbreak continued on the Gulf Coast; activity increased in Arkansas and further east—in Georgia, North and South Carolina, and Virginia. On the Gulf Coast, Louisiana reported record levels of activity for the second year, and Mississippi had its second worst outbreak on record. But, in Texas, overall losses declined for the first time in 3 years, although the number of spot infestations increased in northeastern part of the State.

Spot infestations by State follow. Although Florida reported spots, that State had no counties in outbreak status. In Tennessee, an unknown amount of activity occurred adjacent to the Mississippi-Alabama border.

		Number of Spots	
		1985	1986
	Alabama	1,772	8,126
	Arkansas	435	5,429
	Florida	11	29
	Georgia	744	15,799
	Louisiana	22,000	19,723
	Mississippi	5,606	9,942
	North Carolina	400	6,553
	South Carolina	2,760	7,409
	Texas	16,600	8,538
	Virginia	0	839
		50,328	82,387

Texas leafcutting ant <u>Atta texana</u>	Southern pines	Louisiana, Texas	Serious losses continued in pine plantations on deep sandy soils.
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Twolined chestnut borer <u>Agilus bilineatus</u>	Oak	Kentucky, Tennessee	In Kentucky, activity scattered throughout declining oak stands. Activity also observed in middle and eastern parts of Tennessee, and, again, this activity was associated with oak decline.
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Southern Region--Insects

Southern Region—Status of insects in Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia; and Puerto Rico and the U.S. Virgin Islands—Continued

Insect	Host	Location	Remarks
Variable oakleaf caterpillar <u>Heterocampa manteo</u>	Oak	Arkansas	Several thousand acres of defoliation on dry ridge tops.
Walkingstick <u>Diapheromera femorata</u>	Oak	Arkansas, Oklahoma	Localized defoliation in Le Flore County, OK.
Whitemarked tussock moth <u>Oryzia leucostigma</u>	Laurel oak, live oak, southern red oak, water oak, various ornamentals	North Carolina, South Carolina	Caused scattered, localized problems along the coastal areas of North and South Carolina.
White pine aphid <u>Cinara strobi</u>	Eastern white pine	North Carolina, Tennessee, Virginia	Locally heavy populations caused branch dieback. Locally heavy on Christmas trees. Severe in Fayette County, TN.
White pine cone beetle <u>Conophthorus coniperda</u>	Eastern white pine	North Carolina, Tennessee, Virginia	Beetle populations caused damage in orchards in Tennessee and North Carolina. On the Beech Creek Orchard, cone beetle-caused mortality in untreated blocks approached 100 percent compared to 17 percent in treated areas. High population levels predicted for North Carolina in 1987.
White pine weevil <u>Pissodes strobi</u>	Eastern white pine	Tennessee, Virginia	Beginning to be a problem in Christmas tree plantations in northeastern Tennessee. Minor infestations in five counties in Virginia.
Yellow-poplar weevil <u>Odontopus calceatus</u>	Yellow-poplar	Tennessee	Leaf browning and defoliation of yellow-poplars occurred in Anderson, Campbell, Knox, Overton, and Union Counties. Yellow-poplar scattered over 40,000 acres suffered more than 50-percent defoliation due to feeding by this pest. Feeding in 1986 was more extensive than last year. Frost damage on yellow-poplar may affect weevil survival.

Southern Region--Diseases

Prepared by William H. Sites

Southern Region--Status of diseases in Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia; and Puerto Rico and the U.S. Virgin Islands

Disease	Host	Location	Remarks
STEM AND BRANCH DISEASES			
Canker rot <u>Inonotus hispidus</u> <u>Strumella corvneoidea</u>	Oak	Alabama, Georgia, Mississippi, North Carolina	Was a serious problem in localized areas.
Chestnut blight <u>Cryphonectria parasitica</u> (= <u>Endothia parasitica</u>)	Native chestnuts, exotic chestnuts	Throughout host ranges	Large trees have been eliminated. Damage to sprouts continued, as did research efforts into reducing the virulence of the disease-causing organism.
Cytospora canker <u>Cytospora</u> sp.	Colorado blue spruce	Virginia	Localized; occasionally caused mortality.
Fusiform rust <u>Cronartium quercuum</u> f. sp. <u>fusiforme</u>	Loblolly pine, slash pine	Regionwide, except Kentucky, Puerto Rico, Tennessee, U.S. Virgin Islands	Continued as the most serious disease of southern pines. Fusiform rust stem infections occur on at least 10 percent of the pines growing on about 15 million acres. Annual losses in Florida, Georgia, North Carolina, South Carolina, and Virginia were estimated at \$35 million.
Hypoxylon canker <u>Hypoxylon</u> <u>atropunctatum</u>	Hickory, oak	Regionwide	Common on stressed or weakened trees on forest sites and urban environments. Has become more widespread because of extended drought.
Nectria canker <u>Nectria</u> sp.	Black walnut, yellow-poplar	Kentucky, Tennessee, Virginia	Common on selected sites; caused serious degrade losses.
Pitch canker <u>Fusarium moniliforme</u> var. <u>subglutinans</u>	Southern pines, especially loblolly and slash pines	Alabama, Arkansas, Florida, Louisiana, Mississippi, North Carolina, Texas	Reported on Virginia pine in Florida. Of major concern as a regeneration problem in areas of Alabama and east Texas, where it caused poor survival among first year out-planted seedlings, particularly on old agricultural sites.
Slime flux <u>Erwinia</u> spp. and other bacteria	Oak	Virginia	Incidence dropped during 1986.

Southern Region--Diseases

Southern Region—Status of diseases in Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia; and Puerto Rico and the U.S. Virgin Islands—Continued

Disease	Host	Location	Remarks
Stem canker <u>Fusarium solani</u>	Teak	Puerto Rico, U.S. Virgin Islands	Ubiquitous in plantations. Considerable lumber degrade resulted because termites infested the cankers.
Stem decay Basidiomycetes	All species, especially hardwoods	Regionwide	Continued to be a serious problem. More common in fire- and storm-damaged stands.
White pine blister rust <u>Cronartium ribicola</u>	Eastern white pine	North Carolina, Virginia	Found above 3,000 feet and was only serious in localized areas.
ROOT DISEASES			
Amnosus root disease <u>Heterobasidion</u> <u>amosum</u>	Eastern redcedar, southern pines	Regionwide	Amnosus was the most serious root disease in the South. Damage reported again in thinned stands in Alabama, Florida, Louisiana, Mississippi, North Carolina, and South Carolina. Current surveys showed that the disease may cause a major growth loss, as well as mortality on high- to moderate-hazard sites. Disease hazard soils occur on about 20 percent of the South's land base.
Littleleaf disease complex of site factors, <u>Phytophthora</u> <u>cinnamomi</u> , and <u>Pythium</u> spp.	Loblolly pine, shortleaf pine	Alabama, Georgia, Kentucky, North Carolina, South Carolina, Tennessee	Worse in Piedmont in natural stands growing on eroded, heavy clay soils. Surveys showed considerable growth loss to older loblolly pines growing on high-risk sites. Low incidence elsewhere throughout the South.
Root decay <u>Armillaria</u> spp. <u>Ipogonotus circinatus</u> <u>Phaeolus schweinitzii</u> <u>Gaeodermis lucidum</u>	Most conifers, hardwoods	Regionwide	Common in forest stands and urban environments, especially where stresses were severe or trees overmature. This year, mortality incidence may have been higher because of the severe spring drought.
Root decline <u>Verticicladiella</u> <u>procera</u>	Eastern white pine, loblolly pine	Georgia, North Carolina, Tennessee, Virginia	Losses continued in white pine stands in the southern Appalachians. Disease appeared more common on stressed trees. Was a serious problem in Christmas tree plantations. May be insect vectored.

Southern Region--Diseases

Southern Region—Status of diseases in Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia; and Puerto Rico and the U.S. Virgin Islands—Continued

Disease	Host	Location	Remarks
FOLIAGE DISEASES			
Actinopelte leaf spot <u>Actinopelte dryina</u>	Oak	Georgia, Kentucky, North Carolina, South Carolina, Tennessee, Virginia	Overall incidence dropped during 1986 but locally severe because of dry weather. Plantation sawtooth oak severely affected in Louisiana.
Anthracnose <u>Gnomonia</u> sp. <u>Discula</u> sp. (= <u>Gloeosporium</u> sp.) <u>Kabatella</u> sp. (= <u>Gloeosporium</u> sp.) <u>Apiognomonia</u> sp. (= <u>Gnomonia</u> sp.)	Hardwoods, especially ash, dogwood, maple, sycamore, and walnut	Regionwide	Anthracnose can cause premature defoliation and shoot dieback. The dry spring resulted in low to moderate levels of incidence during 1986. Impact was also low.
Brown spot needle blight <u>Mycosphaerella</u> <u>dearnessii</u> (= <u>Scirrhia acicola</u>)	Loblolly pine, Longleaf pine	Throughout host range, Tennessee	Severe locally, but can be controlled by using prescribed fire and fungicides or by planting genetically resistant stock.
Cedar-apple rust <u>Gymnosporangium</u> <u>juniperi-virginianae</u>	Eastern redcedar	Throughout host range	Caused minor damage to mature trees in localized areas.
Conifer-aspen rust <u>Melampsora medusae</u>	Poplars	Throughout host range	Caused minor damage to mature trees in localized areas.
Dothistroma needle blight <u>Mycosphaerella pini</u> [<u>Dothistroma septospora</u> (= <u>Dothistroma pini</u>)]	Austrian pine	Oklahoma	Still common in urban areas and shelterbelts. Primarily esthetic damage.
Leaf spot <u>Botrytis</u> sp. <u>Drechslera</u> sp. <u>Guignardia</u> sp.	Red maple	Florida	New host.
Needle casts of pine <u>Lophodermium</u> spp. <u>Ploioderma</u> spp.	Pine	Regionwide	Widespread—one of the worst years since the disease was first noted. In Christmas tree plantings in Georgia and South Carolina, the disease was common but was being controlled with fungicides.

Southern Region--Diseases

Southern Region—Status of diseases in Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia; and Puerto Rico and the U.S. Virgin Islands—Continued

Disease	Host	Location	Remarks
Oak leaf blister <u>Taphrina caerulescens</u>	Red oaks	Alabama, Arkansas, Louisiana, Mississippi, Oklahoma, Texas	Scattered but not severe. Unsightly on urban trees. Fewer reports of this problem than in past years.
Pine needle rust <u>Coleosporium</u> spp.	Pine	Regionwide	Premature needle cast may result; low impact.
Septoria leaf spot <u>Septoria</u> sp.	River birch	Florida	Localized damage.
VASCULAR WILTS			
Dutch elm disease <u>Ceratocystis ulmi</u>	Elm	Throughout host range	Reported on scattered urban trees in North Carolina, Tennessee, Louisiana, and Virginia.
Elm phloem necrosis (elm yellows), mycoplasma-like organism	Winged elm	Alabama	Continued to kill scattered urban trees.
Mimosa wilt <u>Fusarium oxysporum</u> f. sp. <u>perniciosum</u>	Mimosa	Throughout host range	Urban trees killed.
Oak wilt <u>Ceratocystis</u> <u>fagacearum</u>	Oak	Arkansas, Kentucky, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia	The number of active infection centers increased in Virginia and Texas. Low incidence reported elsewhere.
Sycamore leaf scorch xylem-limited bacteria	Sycamore	Florida, Georgia, Kentucky, North Carolina, South Carolina, Tennessee, Virginia	Widespread late in growing season.
Verticillium wilt <u>Verticillium albo-atrum</u>	Maple	Virginia	Localized damage.

Southern Region--Diseases

Southern Region—Status of diseases in Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia; and Puerto Rico and the U.S. Virgin Islands—Continued

Disease	Host	Location	Remarks
NURSERY DISEASES			
Anthracnose <u>Gloeosporium</u> sp.	Yellow-poplar	Mississippi	Low-level, persistent problem on nursery stock and outplanted seedlings.
Charcoal root disease <u>Macrophomina</u> <u>phaseolina</u>	Loblolly pine, sand pine, slash pine	Florida	Isolated nursery beds with damage ranging from 1 to 10 percent of seedlings. At Andrews State Nursery, Chiefland, the disease intensified in 1986 as a result of abnormally high temperatures, extended drought, reduced fertilization, and seedling undercutting practices.
Cylindrocladium root rot <u>Cylindrocladium</u> spp.	Eastern white pine	North Carolina	Chronic low-level infection at Edwards Nursery, Morganton. In high-level infection areas, soil fumigation gave adequate control.
	1-0 black walnut, 1-0 yellow-poplar		Localized spots with 15-percent mortality.
Damping-off <u>Cylindrocladium</u> spp. <u>Fusarium</u> spp. <u>Phytophthora</u> spp. <u>Pythium</u> spp. <u>Rhizoctonia</u> spp.	Many conifers and hardwoods	Regionwide	Chronic losses typified by reduced and irregular density in the seedbeds.
Environmental effects			
Drought	2-0 eastern white pine	North Carolina	Excessive heat and seedling transpiration caused needle cast of 1-0 foliage at Edwards Nursery, Morganton.
Temperature fluctuations	Fraser fir	North Carolina	Winter and spring temperature fluctuations caused mortality and reduced growth at the Linville State Nursery, Crossnore.
Frost damage	Conifers and hardwoods	South Carolina	Caused stem dieback on emerging hardwoods.
Fusarium root rot <u>Fusarium</u> spp.	Eastern white pine, loblolly pine	Arkansas, North Carolina, Texas	Persisted as a minor problem in poorly drained beds.

Southern Region--Diseases

Southern Region—Status of diseases in Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia; and Puerto Rico and the U.S. Virgin Islands—Continued

Disease	Host	Location	Remarks
Fusiform rust <u>Cronartium quercuum</u> f. sp. <u>fusiforme</u>	Loblolly pine, longleaf pine, slash pine	Eastern Texas to eastern Virginia	Good control achieved with fungicides.
Rhizoctonia needle blight <u>Rhizoctonia</u> sp.	Eastern white pine, loblolly pine	North Carolina, South Carolina, Virginia	Caused widespread damping-off, stem and bud mortality, and foliage blight. More common in cool, wet areas.
	Longleaf pine	Alabama, Florida, Georgia	Caused needle necrosis in nurseries with deep, sandy soils—particularly during periods of rain. Losses of 30 to 40 percent reported at an industrial nursery in Alabama.
Tip blight <u>Phoma</u> sp.	Loblolly pine	Florida, Georgia, Kentucky, Louisiana, North Carolina, South Carolina, Tennessee, Texas	Forking and brushing widespread east of the Mississippi River. May be related to insect problems.
SEED ORCHARD DISEASES			
Pitch canker <u>Fusarium moniliforme</u> var. <u>subglutinans</u>	Southern pines, especially slash pine and loblolly pine	Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Texas	Orchards have sustained sporadic damage. Caused branch, flower, conelet, and cone mortality. Damage was clonal.
Root diseases <u>Armillaria</u> spp. <u>Armillaria tabescens</u> (= <u>Clitocybe tabescens</u>) <u>Heterobasidion annosum</u> <u>Inonotus circinatus</u> <u>Verticicladiella</u> <u>procera</u>	Eastern white pine, shortleaf pine	North Carolina, South Carolina	Low incidence, but chronic occurrence of symptoms and mortality in seed orchards.
<u>Fusarium solani</u>	Yellow-poplar	North Carolina	Infection has caused the loss of some clones. About one-third of the Beech Creek Seed Orchard in Murphy was infected.

Southern Region--Diseases

Southern Region—Status of diseases in Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia; and Puerto Rico and the U.S. Virgin Islands—Continued

Disease	Host	Location	Remarks
OTHER			
Air pollution effects			
Ozone	Eastern white pine, other conifers	Georgia, Kentucky, North Carolina, South Carolina, Tennessee, Virginia	Of the white pine stands surveyed, 25 percent showed symptoms, and 5 to 10 percent of the trees in each stand were affected. Less severe than last year, but symptoms were common. Incidence highest near cities and sources of pollution.
Unknown	Mixed hardwoods	North Carolina	Trees damaged near a waste incinerator.
Decline	Many hardwoods, conifers	Regionwide, especially Georgia, North Carolina, South Carolina, Tennessee	Drought has caused widespread growth reduction, dieback, and mortality—especially in older age classes. High-use areas were hardest hit. Other contributing factors included soil compaction, vandalism to trees, and storm damage.
Drought	Mixed hardwoods	North Carolina, Virginia	Caused premature defoliation, fall colors, and some mortality.
Frost damage	Hardwoods	Tennessee	Caused defoliation in central Tennessee.
Oak decline	Oak, especially the red oak group and chestnut oak	Regionwide	Severe decline and mortality have been widely reported for the past 6 years. Decline varied considerably from site to site. The problem was most severe on upland sites with shallow soil over rock. Drought was a major contributing factor.
Saltwater spray	Pine	Coastal Virginia	Localized damage.
Spruce-fir decline and mortality	Fraser fir, red spruce	North Carolina, Tennessee, Virginia	The balsam woolly adelgid has been killing Fraser fir since it was introduced into the spruce/fir area more than 25 years ago. Recently, atmospheric deposition has been suggested as a contributing factor to the reported spruce mortality and decline.
Storm damage	Many species	Alabama, Louisiana, North Carolina, Virginia	Storms caused local tree damage, primarily in the coastal areas.

Eastern Region/Northeastern Area--Insects

Prepared by Charles L. Hatch

Eastern Region and Northeastern Area—Status of insects in Connecticut, Delaware, Illinois, Indiana, Iowa, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, West Virginia, and Wisconsin

Insect	Host	Location	Remarks
Basswood thrips <u>Sericothrips tiliac</u>	Basswood	Minnesota, Wisconsin	<p>In northwestern Wisconsin, an outbreak that apparently collapsed in 1985 reappeared in 1986. Basswood was lightly to severely defoliated on about 200,000 acres. An outbreak also continued on the Nicolet National Forest, WI, where plots have been established to measure the impact of the insect.</p> <p>Minnesota reported light defoliation throughout much of the basswood range. This was a decrease from the moderate defoliation reported on 500,000 acres in 1985.</p>
Bruce spanworm <u>Operophtera bruceata</u>	American beech, oak, sugar maple	Maine, Michigan, Minnesota, Pennsylvania, Wisconsin	<p>Spanworm populations continued at generally low levels in Maine. Sporadic patterns of light to heavy defoliation were reported from Menominee, Florence, Forest, Langlade, Marathon, Price, Ashland, and Rusk Counties in Wisconsin. Spanworms were again found throughout Michigan's Upper Peninsula.</p> <p>When complete defoliation of hardwoods was recorded, the spanworm was often found along with other defoliators, including fall cankerworm, linden looper, and forest tent caterpillar. This complex of loopers caused defoliation of northern hardwoods throughout Federal lands in Wisconsin, Michigan, and Minnesota. Most of the defoliation was in the light category. Federal lands where defoliation occurred were the Menominee Reservation; the Nicolet National Forest and portions of the Chequamegon National Forest, WI; and the Kiawatha and Ottawa National Forests, MI.</p> <p>The insect is expected to remain widespread but cause only slight defoliation in 1987.</p>

Eastern Region/Northeastern Area--Insects

Eastern Region and Northeastern Area—Status of insects in Connecticut, Delaware, Illinois, Indiana, Iowa, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, West Virginia, and Wisconsin—Continued

Insect	Host	Location	Remarks
Fall cankerworm <u>Alsophila pometaria</u>	Hardwoods	Massachusetts, Michigan, New Jersey, New York, Pennsylvania, Rhode Island, Wisconsin	In general, the fall cankerworm was reported at low and declining levels in New Jersey, New York, and Massachusetts. Rhode Island reported the fourth consecutive year of minor populations. The outbreak that began in 1985 in south-central Wisconsin declined this year, probably due to a severe frost, which killed the buds on oaks over a large area. In Michigan, however, the insect, in association with other pests, caused localized heavy defoliation in most counties. ✓
Forest tent caterpillar <u>Malacosoma disstria</u>	Aspen, other hardwoods	Illinois, Maine, Michigan, Minnesota, New York, Vermont	More than 60,000 acres of predominantly heavy defoliation occurred in St. Louis and Carlton Counties in Minnesota. This was the 10th consecutive year of activity in this area and represented a fourfold increase in damage. In Michigan, there was scattered but heavy defoliation across the Upper Peninsula. New York reported light defoliation in Cortland and Tompkins Counties and 550 acres of moderate defoliation in Hamilton County. Populations were down in Maine and Vermont. ✓ On Federal lands in southern Illinois, on the Shawnee National Forest, the outbreak doubled in size—to more than 2,100 acres. Food sources in this instance were pin oak and other swamp hardwoods.

Eastern Region and Northeastern Area—Status of insects in Connecticut, Delaware, Illinois, Indiana, Iowa, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, West Virginia, and Wisconsin—Continued

Insect	Host	Location	Remarks
Gypsy moth <u>Lymantria dispar</u>	Oaks, other hardwoods	<ul style="list-style-type: none"> — Connecticut, — Delaware, — Iowa, — Maine, — Maryland, — Massachusetts, — Michigan, — Minnesota, — New Hampshire, — New Jersey, — New York, — Ohio, — Pennsylvania, — Rhode Island, — Vermont, — West Virginia, — Wisconsin 	<p>Total defoliation increased more than 41 percent: It went from 1.7 million acres in 1985 to 2.4 million acres in 1986.</p> <p>Massachusetts, Pennsylvania, and New Jersey reported the most defoliation. About 1.6 million acres were defoliated in these three States. In addition, Pennsylvania recorded the most defoliation of any State: 987,800 acres; however, Connecticut had the largest percentage increase: 165 percent. In that State, the area defoliated went from 89,500 acres in 1985 to 237,200 acres in 1986.</p> <p>Michigan's Lower Peninsula is now generally infested and had widespread defoliation in the south and southeast. More than 64,000 acres were defoliated in Clare, Isabella, Midland, Gratiot, Montcalm, and Saginaw Counties. No gypsy moth defoliation was detected on Federal lands.</p> <p>States where defoliation decreased were Delaware (down 2,000 acres), Massachusetts (down 71,000 acres), and Maryland (down 25,000 acres). No defoliation was reported from New Hampshire and Vermont.</p> <p>In Iowa, 1986 recoveries were at a record high: 15 male moths were recovered from six counties. Only six males were captured in 1985. In Ohio, increasing numbers have been trapped over the years, especially in the northern counties.</p> <p>Pheromone traps were placed in high-use areas of the Nicolet and Chequamegon National Forests in Wisconsin and on the Huron-Manistee National Forest in Michigan. On the Huron-Manistee National Forest, 277 male moths were trapped; none were captured from the other forests.</p>

Eastern Region/Northeastern Area--Insects

Eastern Region and Northeastern Area—Status of insects in Connecticut, Delaware, Illinois, Indiana, Iowa, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, West Virginia, and Wisconsin—Continued

Insect	Host	Location	Remarks
Jack pine budworm <u>Choristoneura pinus</u>	Jack pine	Michigan, Minnesota, Wisconsin	<p>There was no significant defoliation observed in Wisconsin. The outbreak that began there in 1978 continued to decline. Populations also declined in Minnesota. In central Minnesota, 133,000 acres were defoliated; in northeastern Minnesota, 14,000 acres. Jack pine budworm populations remained at low but detectable levels in most of Michigan's Upper Peninsula; however, number of pupae and egg masses in the Baraga Plains indicated a population buildup.</p> <p>On Federal lands, aerial surveys showed continuing outbreaks on the Huron-Manistee and the Superior National Forests in Michigan. Voyageurs National Park in Minnesota had more than 6,000 acres of defoliation.</p> <p>Pheromone traps were used to monitor populations of the jack pine budworm on the Washburn Ranger District of the Chequamegon National Forest in Wisconsin and on the Ottawa and Hiawath National Forests in Michigan. Lower numbers of captured moths confirmed declining populations.</p>
Saddled prominent <u>Heterocampa</u> <u>guttivitta</u>	Hardwoods	Maine, Michigan, Vermont	<p>Maine reported no defoliation even though the numbers of trapped moths increased for the third consecutive year. Maine expects some defoliation in 1987. Only individual caterpillars were reported from Vermont. Defoliation in Michigan was confined to North Fox Island of Leelanau County, where 500 acres were heavily defoliated compared to about 5,000 acres defoliated in 1985. This is the third consecutive year of defoliation.</p>

Eastern Region/Northeastern Area--Insects

Eastern Region and Northeastern Area—Status of insects in Connecticut, Delaware, Illinois, Indiana, Iowa, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, West Virginia, and Wisconsin—Continued

Insect	Host	Location	Remarks
Spruce budworm <u>Choristoneura</u> <u>fumiferana</u>	Balsam fir, spruce	Maine, Michigan, Minnesota, New Hampshire, New York, Vermont	<p>In Maine, populations have declined since 1982. Moderate to severe defoliation in 1986 was reported on 600,000 acres—down from 1.2 million acres in 1985. Nearly all the defoliation occurred in Hancock and Washington Counties. Small patches of moderate defoliation were seen in Somerset and Aroostook Counties. Continued decline—to about 230,000 acres—is predicted in 1987.</p> <p>Losses from past defoliation continued to accumulate. Trees die annually in heavily damaged stands—even with no recent budworm feeding. Areas where 25 percent of host trees have succumbed covered approximately 315,000 acres compared to 310,000 acres in 1985.</p> <p>New Hampshire, New York, and Vermont had no aerially detected defoliation.</p> <p>In the Lake States, populations appear to have collapsed across the Upper Peninsula of Michigan—although about 1,600 acres of defoliation were reported. Minnesota, on the other hand, had 440,000 acres of defoliation in its three northeastern counties—a 33 percent increase. Minnesota predicts further increases in the northern townships and perhaps a spread of heavy defoliation into southwestern Cook County.</p> <p>On Federal lands, the spruce budworm remained active on the Superior National Forest, MN, which had more than 70,000 acres of defoliation. Another 1,024 acres were defoliated on the Hiawatha National Forest in Michigan; 248 acres on Voyageurs National Park in Minnesota; and 46 acres on Isle Royale National Park in Michigan.</p>

Eastern Region/Northeastern Area--Diseases

Prepared by Charles L. Hatch

Eastern Region and Northeastern Area—Status of diseases in Connecticut, Delaware, Illinois, Indiana, Iowa, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, West Virginia, and Wisconsin

Disease	Host	Location	Remarks
STEM AND BRANCH DISEASES			
Beech bark disease <u>Cryptococcus fagisuga</u> ; <u>Nectria coccinea</u> var. <u>faginata</u>	American beech	New England, New Jersey, New York, Ohio, Pennsylvania, West Virginia	The incidence of both <u>Nectria</u> and <u>Cryptococcus</u> continued to increase in Vermont, New York, and Pennsylvania. Aerial surveys recorded 371 acres of damage in Orleans and Caledonia Counties in Vermont. In New York, severe mortality was observed during aerial detection flights over Lewis County.
Diplodia blight <u>Sphaeropsis sapinea</u> (= <u>Diplodia pinea</u>)	Austrian pine, jack pine, red pine, Scotch pine	Minnesota, New Jersey, Ohio, Rhode Island, Wisconsin	In Wisconsin, indicator plots in Douglas County showed a 3- to 7-percent increase in the numbers of trees infected with <u>Diplodia</u> . The disease was also present in red pine seedlings in nurseries. Diplodia blight was scattered throughout Ohio; light to moderate infection occurred on ornamentals. New Jersey advised landscapers not to use Austrian pine for ornamentals or in plantations. In Minnesota, small, localized stands of red pine in Beltrami and Hubbard Counties showed a high incidence of <u>Diplodia</u> . Although found throughout Rhode Island, the disease has declined in that State for the third straight year.
European larch canker <u>Lachnellula willkommii</u>	Larch	Maine	No new infected townships were located in 1986. The two epicenters (in the towns of Cutler/Jonesboro and Friendship) were heavily infected; however, infection was light to moderate elsewhere in Maine.
Scleroderris canker <u>Gremmeniella abietina</u>	Eastern white pine, jack pine, red pine, Scotch pine	Maine, Michigan, New York, Wisconsin	Maine reported no losses from this canker. The only reported mortality came from Michigan, where some losses of 1- to 3-foot-tall jack pine were associated with frost pockets in Luce and Schoolcraft Counties. New York reported generally light infections, but their incidence over the past 3 years has increased. The canker was also reported from Bayfield and Douglas Counties in Wisconsin. In both counties, the disease was very light and scattered.

Eastern Region/Northeastern Area--Diseases

Eastern Region and Northeastern Area—Status of diseases in Connecticut, Delaware, Illinois, Indiana, Iowa, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, West Virginia, and Wisconsin—Continued

Disease	Host	Location	Remarks
VASCULAR WILTS			
Dutch elm disease <u>Ceratocystis ulmi</u>	Elm ✓	Areawide	Dutch elm disease continued to be found wherever elm grows. Its incidence has increase substantially in Bangor, ME, since the recent sanitation program was abandoned. New York reported Dutch elm disease in forest stands in Fulton County.
Oak wilt <u>Ceratocystis fagacearum</u>	Oak	Areawide ✓	<p>Oak wilt continued to spread throughout the southern two-thirds of Wisconsin. Aerial surveys found seven pockets of oak wilt in Marinette County. Six of these infection centers were along the Menominee River east of Wausaukee; the other was approximately 7 miles southwest of Wausaukee. In Shawano County, oak wilt continued to spread east and north of Shawano Lake and west and north of Round and Grass Lakes. Since 1982, oak wilt has slowly spread in the Legend Lake area in Menominee County; in 1986, nine new pockets were observed.</p> <p>In Michigan's Menominee Country, approximately 102 epicenters of oak wilt, ranging in size from 1/20 to 10 acres, were reported in the Shakey Lakes area. An estimated loss of 3,200 trees has occurred in this unique 10,000-acre oak forest. All but seven of the epicenters have had root graft barriers established by using a vibratory plow. The few remaining untreated epicenters will be treated in 1987.</p> <p>An oak wilt epidemic covered an extensive four-county area north of Minneapolis/St. Paul, MN. There were also epicenters scattered throughout central and southeastern Minnesota.</p>

Eastern Region/Northeastern Area--Diseases

Eastern Region and Northeastern Area—Status of diseases in Connecticut, Delaware, Illinois, Indiana, Iowa, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, West Virginia, and Wisconsin—Continued

Disease	Host	Location	Remarks
OTHER			
Ash decline and mortality	Ash	Illinois, Indiana, Iowa, New York, Ohio, Minnesota	The incidence and severity of ash decline increased throughout the Northeast. This disease has been confirmed in several locations in Iowa, Indiana, northern Illinois, New York, and Ohio. ✓ In Minnesota, the State Shade Tree Advisory Committee reported that ash decline killed rural and urban green ash and caused significant losses in the shade tree nurseries.
Larch decline and mortality	Larch	Maine, Vermont	Larch decline continued in areas that had previously recorded heavy mortality. ✓ In Essex, Orleans, and Caledonia Counties in Vermont, 108 acres containing mortality were mapped.
Maple decline and mortality	Maple	Michigan, New York, Vermont	Maple decline continued to occur in scattered areas in Vermont, where the disease was reported to be more severe on wounded trees, especially on shallow or wet sites at higher elevations. ✓ Heavy losses have been reported on more than 300 acres of red maple in Wayne County, NY. The disease was a continuing problem in urban areas of Michigan's Upper Peninsula.
Oak decline and mortality	Oak	Michigan, New York, Ohio	Small pockets of oak decline mortality were scattered across Ohio. Although its incidence is increasing, the disease was significant only in residential areas and old pastured woodlots. ✓

Eastern Region/Northeastern Area--Diseases

Eastern Region and Northeastern Area—Status of diseases in Connecticut, Delaware, Illinois, Indiana, Iowa, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, West Virginia, and Wisconsin—Continued

Disease	Host	Location	Remarks
Spruce-fir decline and mortality	Fir, spruce	New Hampshire, New York, Vermont	<p>In New York, more than 5.1 million acres of red spruce are presently in decline. Moderate to heavy mortality has occurred on 326,000 acres of spruce-fir and mixed wood types in northern New York. This includes specific reports of more than 46,000 acres moderately to severely affected in Herkimer, Jefferson, and Lewis Counties. Red spruce decline remained common in high-elevation sites, as well as on certain well-drained, lower elevation stands. In addition, over 168,000 acres in New Hampshire and 50,000 acres in Vermont have moderate to heavy mortality.</p> <p>Spruce beetle, ghost moth (<u>Hepialis gracilis</u>), eastern dwarf mistletoe, climate, stand age, and other factors—including atmospheric deposition—have been associated with the decline. But the actual causes have not been determined.</p> <p>All major mortality areas in New York, Vermont, New Hampshire, and western Maine are presently being mapped.</p>
Weather damage	Various species	Maine, Vermont, Wisconsin	<p>Frost was especially damaging during 1986 in Vermont; most noticeably affected were balsam fir, Douglas-fir, aspen, red maple, sugar maple, beech, and white ash. In southern Wisconsin, frost also damaged black and white oaks. In central Vermont, an ice storm in March caused heavy damage in scattered locations. The ice affected beech, yellow birch, sugar maple, and white ash. Most of the damage occurred between 1,800 and 2,500 feet; 600 acres were affected in Winhall. Data from Peru and Andover showed that 70 percent of the basal area had broken crowns; 17 percent of the broken crowns were half gone.</p> <p>A June hailstorm caused damage over a broad area around Naples and Raymond, ME.</p>

Alaska Region--Insects

Prepared by Edward H. Holsten

Alaska Region--Status of insects in Alaska

Insect	Host	Location	Remarks
A spruce budworm <u>Choristoneura</u> sp.	Sitka spruce	Southeast Alaska	Light budworm defoliation was observed on 240 acres of spruce near Haines. No activity was noted on white spruce in south-central Alaska. Populations are expected to increase in 1987.
Cottonwood leaf beetle <u>Chrysomela</u> sp.	Balsam poplar, black cottonwood	Southeast Alaska	Leaf beetle defoliation reached its highest level in many years. In the Mendenhall Valley and along the Chilkat and Klehinin Rivers near Sullivan Island, the leaf beetle defoliated 580 acres
Engraver beetle <u>Ips perturbatus</u>	White spruce	Interior Alaska	<u>Ips</u> populations dramatically increased near Fairbanks. Infestations with pockets of severe mortality are scattered over 17,000 acres.
Gypsy moth <u>Lymantria dispar</u>		Southeast Alaska	Two larvae and one pupa were found in household goods shipped into Juneau. No gypsy moth adults were captured in pheromone-baited traps.
Hemlock sawfly <u>Neodiprion tsugae</u>	Western hemlock	Southeast Alaska	The amount of defoliation declined from 28,000 acres in 1985 to 18,000 acres in 1986. Small pockets of new defoliation totalling 8,000 acres were detected on and near Prince of Wales Island.
Large aspen tortrix <u>Choristoneura</u> <u>conflictana</u>	Quaking aspen	Interior Alaska	Tortrix populations dramatically increased, especially near Fairbanks. Aerial surveys in 1986 detected almost 350,000 acres of defoliated aspen compared to 3,000 acres detected in 1985. Populations are expected to remain high in 1987.
Leaf roller <u>Epinotia solandriana</u>	Paper birch	Interior and south-central Alaska	Defoliation apparently caused by the leaf roller was detected on 10,000 acres of birch scattered throughout south-central and interior Alaska. This represents a 60 percent decrease in the area of defoliation reported in 1985.

Alaska Region--Insects

Alaska Region--Status of insects in Alaska--Continued

Insect	Host	Location	Remarks
Spearmarked black moth <u>Rheumaptera hastata</u>	Paper birch	Interior Alaska	Populations continued to decline: 19,000 acres of defoliated birch were detected in 1986 compared to about 36,000 acres in 1985 and 300,000 acres in 1984.
Spruce beetle <u>Dendroctonus</u> <u>rufipennis</u>	Lutz spruce, Sitka spruce, white spruce	Throughout Alaska	<p>Infestations covered 368,000 acres—approximately 100,000 acres more than in 1985. Infestations continue on 40,000 acres of the Chugach National Forest and on 55,000 acres of the Kenai National Wildlife Refuge. Spruce beetle populations are expanding in Glacier Bay National Park where nearly 18,000 acres have been infested.</p> <p>For the first time, beetle activity has been documented in interior Alaska: More than 60,000 acres of white spruce are currently infested along the Yukon River south of Galena.</p>
Spruce bud midge <u>Rhabdophaga swainei</u>	Black spruce, white spruce	South-central Alaska	Bud midge damage was prevalent on open grown regeneration throughout the Kenai Peninsula. In many cases, multiple leaders result.
Tortricidae	<u>Salix</u> sp.	Interior Alaska	Defoliation of willow was detected on more than 20,000 acres along the Nushagak and Yukon Rivers. The causal agent has yet to be identified.
Western blackheaded budworm <u>Acleris gloverana</u>	Sitka spruce, western hemlock	Southeast Alaska	Budworm populations remained at low levels in 1986. On Tuxekan Island, only 80 acres of spruce and hemlock showed signs of defoliation.

Alaska Region--Diseases

Prepared by Edward H. Holsten

Alaska Region--Status of diseases in Alaska

Disease	Host	Location	Remarks
STEM AND BRANCH DISEASES			
Hemlock canker <u>Xenomeris abietis</u>	Western hemlock	Southeast Alaska	The incidence of this canker was lower this year than in the previous years. <u>Xenomeris</u> killed small hemlocks and the lower crowns (up to 40 feet) of larger hemlocks along some 30 miles of roads on Prince of Wales Island. This disease only occurred within 130 feet of the roads.
Hemlock dwarf mistletoe <u>Arceuthobium tsugense</u>	Western hemlock	Southeast Alaska	This seed-bearing parasite continued to be the most destructive disease of old-growth western hemlock. Recent studies indicate that mistletoe infection levels are much lower in young-growth stands than were previously suspected. A species of <u>Nectria</u> was found attacking swollen hemlock branches infected with dwarf mistletoe. This fungus may kill the mistletoe and thereby serve as a biological control.
Stem decays	Lutz spruce, redcedar, Sitka spruce, western hemlock, white spruce	Southeast and south-central Alaska	Wood decay of living trees continued to be one of the most important causes of volume losses in Alaska. A variety of genera and species are involved. The problem is particularly acute in old-growth forests, where slow growing decay fungi have ample time to cause significant losses.
Tomentosus root rot <u>Inonotus tomentosus</u>	Lutz spruce	South-central Alaska	<u>I. tomentosus</u> caused most of the decay found on the Kenai Peninsula. Besides causing heart rot, the fungus colonized and apparently killed the sapwood and cambium on the roots of some live spruce.
Western gall rust <u>Endocronartium barknessii</u>	Shore pine	Southeast Alaska	Gall rust continued to cause spherical galls on branches and boles of shore pine. This year, another fungus, <u>Nectria macrospora</u> , killed many of these galls on pines in the Gustavus and Juneau areas. <u>Nectria</u> has killed the limbs from the galls outward.

Alaska Region--Diseases

Alaska Region--Status of diseases in Alaska--Continued

Disease	Host	Location	Remarks
FOLIAGE DISEASES			
Foliage diseases of cedar <u>Gymnosporangium</u> <u>nootkanensis</u> <u>Didymascella thujina</u>	Alaska cedar, redcedar	Southeast Alaska	<u>Gymnosporangium</u> on Alaska cedar and <u>Didymascella</u> on western redcedar occurred at low levels this year. They neither severely defoliated nor killed cedars.
Hemlock needle rust <u>Pucciniastrum vaccinii</u>	Western hemlock	Southeast Alaska	The rust occurred at low levels in 1986. But the alternate host, blueberry, was more heavily infected than in previous years; thus, increased levels of infection on hemlock are expected in 1987.
Shoot blight of Alaska cedar <u>Arctostaphylos</u> sp.	Alaska cedar	Southeast Alaska	This fungus was recently discovered in naturally regenerating Alaska cedar. On seedlings and saplings, it killed terminal and lateral shoots back about 4 inches. Mature trees were not infected by the fungus.
Sirococcus tip blight <u>Sirococcus strobilinus</u>	Sitka spruce, western hemlock	Southeast Alaska	The incidence of <u>Sirococcus</u> declined in 1986. Hemlock was more susceptible than spruce, and unthinned stands had the highest infection levels. Infections were concentrated in the lower portion of the live crown.
Spruce broom rust <u>Chrysomyxa</u> <u>arctostaphyli</u>	Lutz spruce, white spruce	Interior and south-central Alaska	Broom rust was common wherever spruce grew near the alternate host, bearberry (<u>Arctostaphylos uva-ursi</u>). The fungus caused perennial infections that resulted in large, dense clusters of branches. Top-kill or mortality sometimes occurred.
Spruce needle cast <u>Lirula macrospora</u>	Sitka spruce	Southeast Alaska	This needle cast was common on second-growth Sitka spruce stands throughout southeastern Alaska. <u>Lirula</u> infects the current year's needles, but symptoms do not become apparent until these needles are 1 year old.
Spruce needle rust <u>Chrysomyxa ledicola</u>	Sitka spruce, white spruce	Throughout Alaska	Very little spruce needle rust occurred in 1986.

Alaska Region--Diseases

Alaska Region--Status of diseases in Alaska--Continued

Disease	Host	Location	Remarks
OTHER			
Decline	Alaska cedar	Southeast Alaska	Alaska-cedar decline persisted as one of the most important forest diseases in southeastern Alaska. Some form of environmental stress is suspected as the causal agent. This problem has been occurring for almost 100 years. About 206,000 acres of decline have been delineated during aerial surveys. This year, decline was particularly concentrated on Kupreanof and Chichagof Islands.
Brown bear damage	Alaska cedar	Southeast Alaska	Brown bears continued to cause basal scars on Alaska cedar on Baranof and Chichagof Islands. Other tree species are unaffected. Trees with old scars have associated columns of wood decay that will limit the value of butt logs from scarred trees.
Hemlock fluting	Western hemlock	Southeast Alaska	Fluting of hemlock continued to be a problem throughout southeastern Alaska. Fluted hemlocks have deeply incised grooves and ridges extending vertically along their boles. The cause of fluting is not known.
Porcupine damage	Sitka spruce, western hemlock	Southeast Alaska	Porcupine damage was noted in several precommercially thinned stands of spruce and hemlock on Mitkof Island and on Etolin and Wrangell Islands. Porcupine feeding was generally patchy: Groups of 15-30 trees were affected.

Part 3. Index

Index -- Insects

The common and scientific names of the insects come from "Common Names of Insects and Related Organisms," published in 1982 by the Entomological Society of America, and two U.S. Department of Agriculture publications: "Western Forest Insects" (Miscellaneous Publication 1339; 1977) and "Insects of Eastern Forests" (Miscellaneous Publication 1426; 1985).

In addition, the names in the index have been reviewed by Forest Insect and Disease Research.

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In addition, the names in this index have been reviewed by the Center for Forest Mycology Research at the Forest Service's Forest Products Laboratory in Madison, WI.

The scientific names of the disease-causing organisms may change. Synonyms of recently changed names are in parentheses in the tables; anamorphs are shown in brackets. This differentiation is not made in the index.

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